THE IRON AGE

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THE IRON AGE

New York, Thursday, December 9, 1909.

A MODERN BOILER SHOP.*

Features of the New Plant of the Heine Safety Boiler Company at St. Louis, Mo.

BY E. R. FISH.

The design of a factory for building steam boilers and doing the kind of sheet metal work allied thereto is not as intricate a problem as that of most other lines of manufacture. There were some interesting features, however, connected with the building of a recent plant that may be of service to others. As an illustration of a modern factory of this kind this description of the Heine Safety Boiler Company's new shop at St. Louis, Mo., is presented.

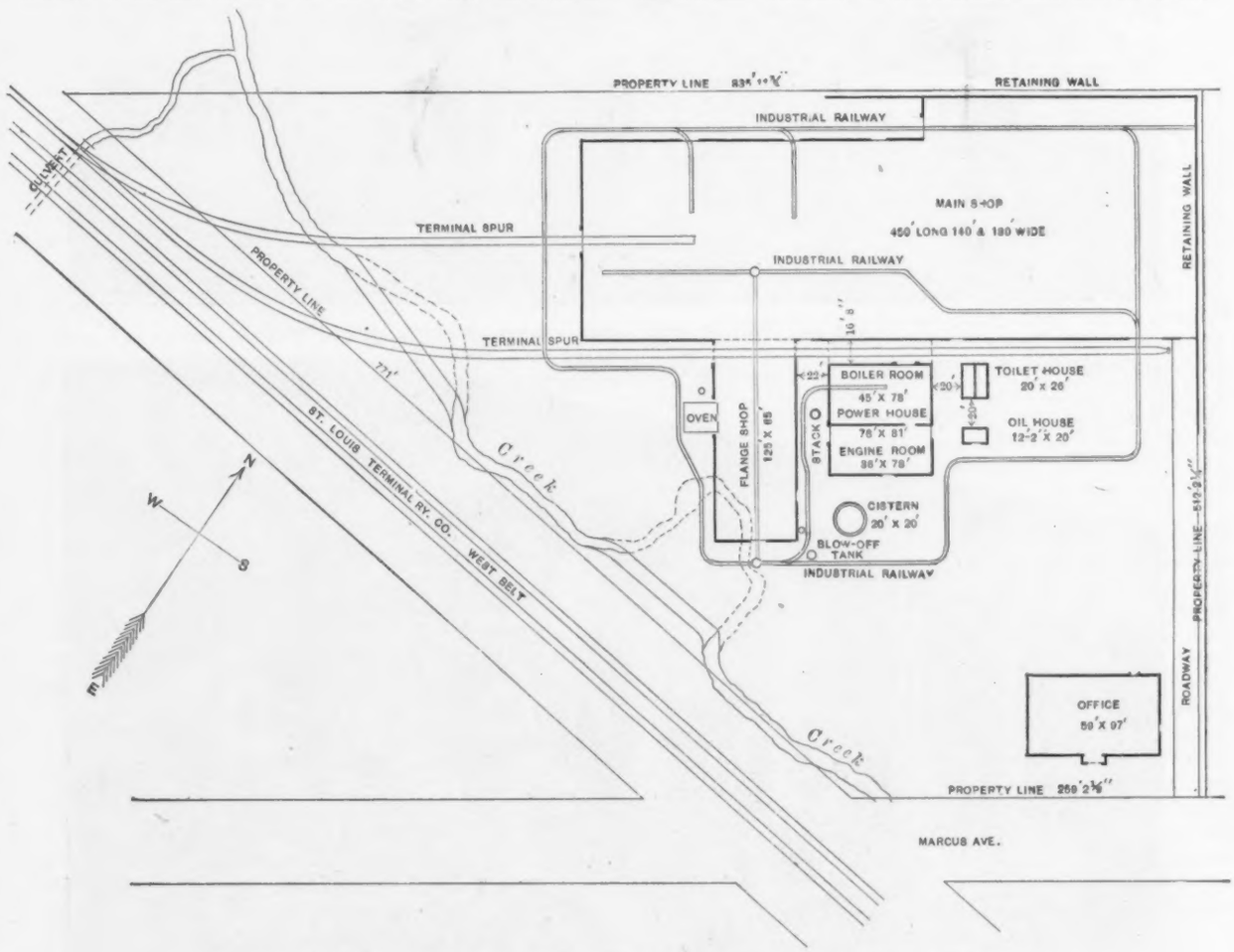


Fig. 1.—General Plan of the Heine Safety Boiler Company's New Shops at St. Louis, Mo.

Site and Layout.

The property on which the shop is located lies at the intersection of East Marcus avenue and the west belt of the Terminal railway, a double track main line. In shape it is a trapezoid, one end being perpendicular to the sides, the other being at an angle of about 45 degrees. The four sides are respectively 259 ft., 512 ft., 771 ft. and 836 ft.—an area of 6½ acres. A small stream meanders approximately on the railroad property line, Fig. 1. The original surface of the ground sloped from an elevation at the creek bank of 24 ft. above city datum to 67 ft. at the inner corner. The grade was fixed at 47 ft., that being the elevation of the railroad tracks. To prepare the ground for building it was necessary to excavate the higher and fill in the lower portions of the site. There was just about enough material to fill in as much of the lot as was required for immediate use, leaving a considerable area for the future disposition of cinders, &c. The stream was straightened in two places. A large municipal trunk sewer will soon be built along its course, after which the entire area will be available for such use as may be desired.

A reinforced buttressed concrete retaining wall, with a maximum hight of 19½ ft. above grade at the corner and stepped down on the end and side, following the slope of the hill, is built 4 ft. inside the property line, so as to keep the wide footings within the site. This wall forms a part of the end and side of one of the buildings.

The buildings consist of a main shop, flange shop (which is a wing of the main shop), power house, toilet and wash house, oil house and general office, totaling about 2¼ acres of floor space. The relative locations are shown in Fig. 1.

The switch connections enter with long radii curves, becoming tangents parallel to the buildings before reaching them. At present there are two, one of which enters

* From a paper read November 13, 1909, at a joint meeting of the Engineers' Club of St. Louis and the St. Louis section of the American Society of Mechanical Engineers.

the main shop and is the shipping track; the other passes alongside the main shop between it and the flange shop and power house and is the receiving truck. Another switch will be placed along the opposite side of the main building when conditions demand. A 100-ton 42-ft. extra heavy Howe track scale is located on the railroad right of way near the connection to the main track. The office building is on the opposite side of the property facing Marcus avenue, far enough away to avoid serious interference from the noises of the shop.

General Features.

In general the raw material is received at the far end of the large building, that being the storage space.

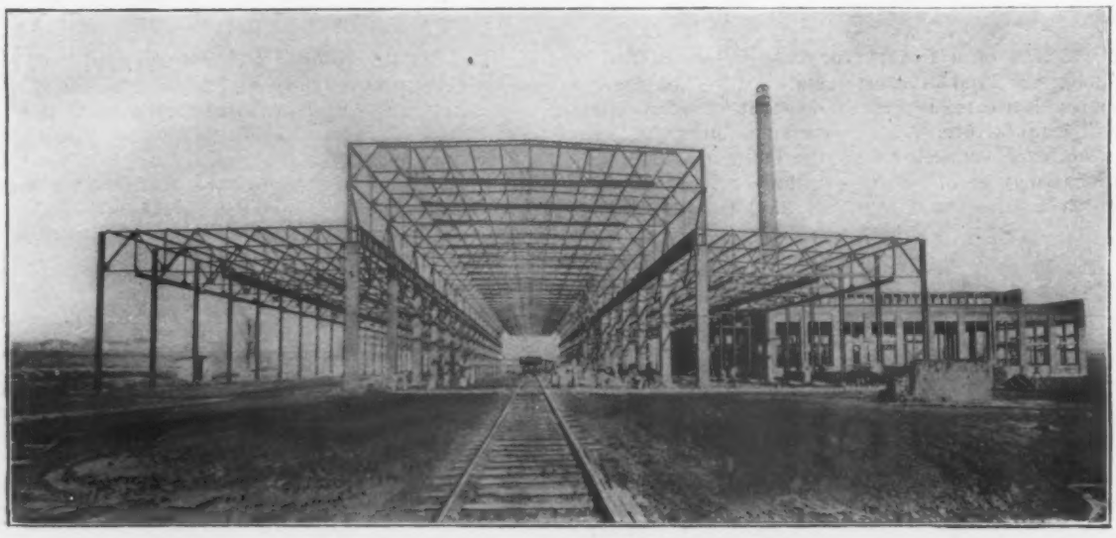


Fig. 2.—Steel Frame Work, Showing Middle and Side Bays and 14-Ft. Monitor.

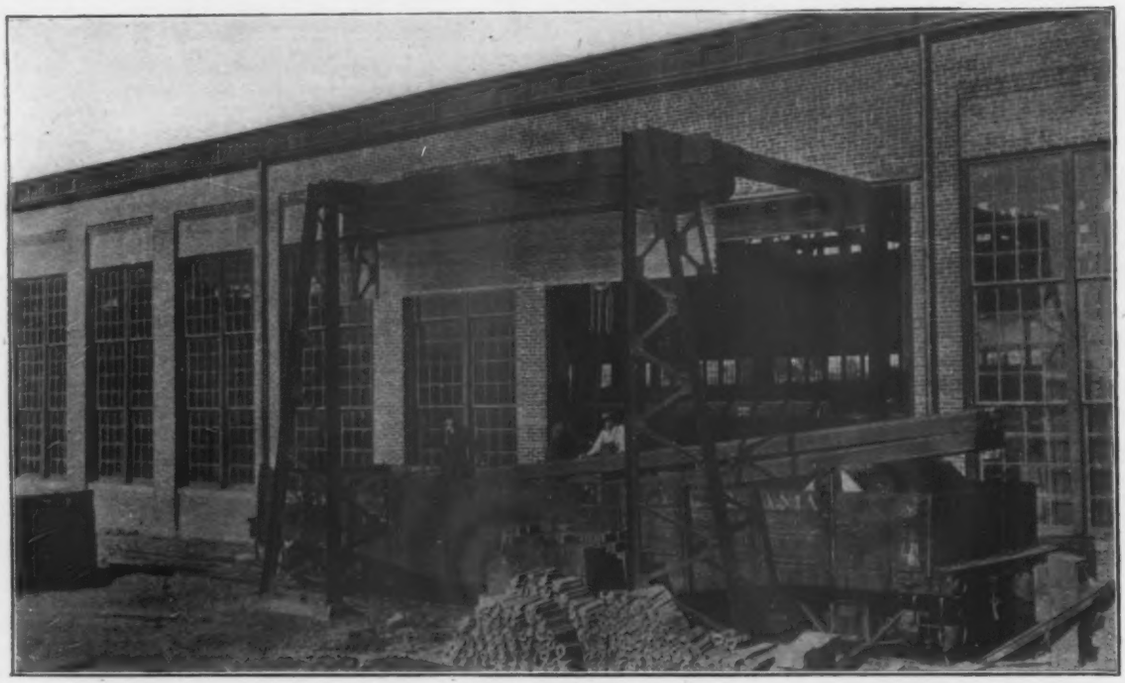


Fig. 3.—Special Entrance with Transverse Craneway for Receiving Materials, Also Special Rolling Steel Door.

During the manufacturing processes it passes without reversal to the opposite end, where the completed boilers are stored and shipped. Tubes, not being needed until boilers are assembled, are received and stored at this end. The whole floor area of both main and flange shops is served by large or small traveling cranes, while a 24-in. gage Koppel industrial track completely encircles the structure, with connections in the interior. A roadway leads from Marcus avenue into the receiving end of the main building. A portion of the interior of this building is partitioned off for a machine shop to do the little work of that nature required in manufacturing and to care for ordinary repairs and maintenance.

Three sources of power for the operation of the equipment are used—electric, hydraulic and pneumatic. All the generating machinery is located in the power house, which is placed in close proximity to the hydraulic and pneumatic tools, in order to reduce the length of the transmission lines, saving both in first cost, frictional losses and maintenance. The great majority of the tools are electrically driven, by individual Wagner motors wherever practicable.

As far as practicable all water is saved, to effect which a drainage system is provided into which all rain water from the roofs as well as the clean waste from manufacturing processes is discharged. This system discharges into a large cement lined cistern 20 ft. in diameter by 20 ft. deep near the power house. As the only source of water supply is from the city mains, this arrangement effects a very appreciable economy.

Type of Building.

It was determined to eliminate the fire hazard and to build durably and yet have a maximum of natural light in the interior, which meant large window space. Steel frame structures with outside walls of brick and reinforced concrete slab roofs were accordingly adopted, with full length monitors in the middle in order to obtain additional light and ventilation. About 75 per cent. of the vertical areas, exclusive of the retaining walls, are glass. One size of window pane is used throughout, this

being a commercial size 12 x 16 in. The advantage of this will be appreciated when it is said that there are over 22,000 panes. Wood is used only for window and door frames and doors and the machine shop floor.

Construction of Main Shop.

This building is 450 ft. long by 143 ft. wide for 250 ft. of its length and 180 ft. for the remaining 200 ft. It is of this latter part that the retaining walls form one side and end. The narrow portion is divided into three longitudinal bays, the middle one being 60 ft. wide and the other two side ones 41½ ft. The increase to 180 ft. is made by the addition of a fourth bay of 37 ft. The design of the steel frame follows standard practice, being calculated for the dead and live loads imposed by the roof and traveling cranes, the runways for which are 9-in. I beams hung to the lower chords of the roof trusses, with the exception of the large craneway, which is carried directly on columns. The roof trusses are spaced 12½-ft. centers, carried on the columns forming the bays. The columns of the central bay are spaced 25 ft. centers longitudinally, 60 ft. transversely, and carry the 25-ton traveling craneway. The spacing of the trusses thus provides stiffeners at the center points of the main crane runway and provides spans of only 12½ ft. for the support of the smaller runways in the side bays. The roof of the middle bay is 14 ft. higher than that of the side bays, thus forming the monitor in which the principal crane runs, Fig. 2. About the middle of the side toward the power house is the riveting tower, 100 x 24 ft., its roof being 55 ft. above the floor. The steel work of this tower is framed into that of the building proper.

Both sides of the monitor are practically all window space, there being two rows of sashes which are each 3 ft. 5 in. by 5 ft. 10 in. Those of the lower row are stationary; those of the upper row are pivoted at the middle so that they can be opened for ventilating purposes, the Lovell window operating device being used.

The standard size of door opening is 9 ft. 8 in. by 12 ft. high, closed by two equal swinging doors, one of which contains a small door for employees. In the receiving end is a special door opening 22 ft. 2 in. wide by 20 ft. high. Through this is carried a transverse craneway 18 ft. 8¼ in. span, projecting outside the building over the receiving track, the outer end being carried by A frames, Fig. 3. This connects with the longitudinal cranes on the inside, thus permitting the unloading of material from cars expeditiously and cheaply. This large opening is closed by means of a special Variety rolling steel door carried on trolleys which run on the craneway. The carriage for this door is covered with a hood which entirely closes the opening above and between the beams when against the building, the door and its rolling mechanism being suspended below the craneway beams. When in this position the rolling door lowers into the guides provided at the sides of the opening, and when it is entirely rolled up the whole carriage may be moved to the outer end of the craneway, thus giving an unobstructed passage for the traveling crane and at the same time preserving the continuity of the craneway. The door and carriage are operated by means of gears and hand chains. The hood so protects the mechanism of the carriage and the door when it is rolled up that it can be left exposed at the outer end of the craneway. Although the door is large it can be opened and closed by one man, even in a high wind.

The roof is a 2½-in. concrete slab, reinforced with wire mesh and carried by 6-in. I-beam purlins placed 5 ft. centers on the top chords of the roof trusses. This is covered with two-ply tar felt and gravel laid in hot asphalt. Two transverse expansion joints, dividing the roof into three equal sections 150 ft. long, provide for changes in dimensions due to temperature. These joints are flashed with copper. The gutter troughs and downspouts are of 16-oz. copper, supported by ⅝ x 1½ in. galvanized brackets set in the brickwork. Ample expansion joints are provided in the troughs to prevent buckling or breakages. Each down spout connects with a cast iron shoe to the underground drainage system, so that rain water acts as an auxiliary water supply.

The floor will ultimately be of cinders, with a heavy residuum of oil binder and compacted by rolling. At present it is the natural clay. The shipping track at the front end enters through a sliding door 14 x 16 ft., holds two cars inside the building and bisects the testing floor, which is a brick pavement 62 x 76 ft. laid in cement on a concrete base.

Construction of Flange Shop, Power House, Etc.

This building is 62 ft. 4 in. wide by 144 ft. long, the construction being similar in every way to that of the main building, to which it is connected, the end wall being omitted so that the two structures are practically one. This building has a monitor 13 ft. wide by 9 ft. high. Door openings 16 ft. 10 in. wide by 20 ft. 9 in. high are placed in the side walls at the ends next the main building through which the receiving switch passes. These openings are closed by Kinnear rolling steel doors.

The power house is 75 ft. wide by 79 ft. long. It is divided into an engine room, 34 ft. 7 in. wide, and boiler room, 42 ft. 11 in. wide, by a brick wall. An overhead traveling crane serves the engine room. The roof is continued over the space between this building and the main building in order that coal cars may be unloaded without regard to the weather. The outer wall of the boiler room is carried up solid to the coal holes, a hight of 8 ft. The coal holes are opposite the boilers and are 3 ft. high and 10 ft. long, with heavy iron frames set in the brickwork and closed with iron doors. Above the coal holes is a row of windows.

The toilet and wash house is located 16 ft. 10 in. from the main shop and 20 ft. from the power house. It is a one-story brick building, 20 x 26 ft., with a concrete roof and floor, and divided by a brick wall into two rooms about 9 ft. wide, one of which contains 10 washdown closets and an iron enameled urinal, both with automatic flushes. White enameled wash sinks with numerous hot and cold faucets are in the other room. A galvanized house boiler, heated by exhaust steam, furnishes a supply of hot water. Lighting is by small windows near the top of the walls.

The oil house, a one-story brick building 12 x 20 ft., with a concrete roof and floor, is intended solely for the storage of inflammable liquids, &c.

Equipment of the Main Shop.

In the main shop are stored all the raw material and supplies, &c. Most of this storing is done at the extreme rear end and side, where there is the least light, yet where the material is accessible. A 3-ton Yale & Towne traveling crane on the transverse craneway heretofore mentioned serves the delivering track and places the boiler plate, which is the heaviest material received, directly in a series of racks that hold the plates in a vertical position so that any plate may be withdrawn without unnecessary handling. The side bays are each served by four 3-ton 14-ft. Curtis traveling cranes with hand operated triplex blocks running on two adjacent parallel craneways in each bay, hung to the bottom chords of the roof trusses. The main shop contains tools as follows, arranged as shown by Fig. 4. The motor sizes given indicate that the machine is driven by an individual motor:

1 Ryerson high speed friction saw, 30-hp. motor.
1 24-in. Kraut punch, 7½-hp. motor.
1 36-in. Long & Allstatter punch, 7½-hp. motor.
1 36-in. Cleveland punch, 7½-hp. motor.
1 8-ft. Lennox splitting shears, 7½-hp. motor.
1 60-in. Cleveland punch and shear, 10-hp. motor.
1 Lennox rotary bevel shear, 7½-hp. motor.
1 14-ft. Hilles & Jones bending roll, 10-hp. and 30-hp. motors.
2 100-ton Woods triple power hydraulic riveters.
1 30-in. Long & Allstatter horizontal punch, 7½-hp. motor.

The last three machines are located under the riveting tower and are served by three 10-ton Wood hydraulic tower traveling cranes, with 40 ft. lift and 20 ft. 7 in. span. One unoccupied section in this tower provides for an additional riveter.

2 5-ft. radial drills belted from a shaft driven by a 10-hp. motor supported overhead on a bracket bolted to the wall.
1 Wood portable hydraulic riveter, which is handled by the hydraulic hoist in the 30-in. horizontal punch tower.
1 25-ton Pawling & Harnischfeger electric traveling crane, 26½ ft. lift, 60 ft. span, with 5-ton auxiliary hoist, with General Electric motors for all movements.

There is an outfit of pneumatic caulking, riveting and chipping hammers, and the following sheet iron working tools:

1 angle bending roll, 10-hp. motor.
1 sheet iron brake, 7½-hp. motor.
1 42-in. Lennox splitting shear, 7½-hp. motor.
1 36-in. Kraut punch, 7½-hp. motor.
1 8-ft. Hilles & Jones bending roll, 10-hp. motor.
2 6-in. Cleveland punches belted to a countershaft driven by a 7½-hp. motor.
1 6-ft. Hilles & Jones bending roll.
1 24-in. Long & Allstatter punch.
The two latter are belted to a countershaft driven by a 7½-hp. motor.

The machine shop equipment is mainly belt driven by a 20-hp. motor through a line shaft. There are four lathes of various sizes, one shaper, one universal milling machine, three different sizes of radial drills, one planer, one heavy duty motor driven boring mill, one double head bolt cutter, two pipe threading machines, a combination grinder, one wet grinder.

Equipment of Flange Shop.

The tools in the flange shop, as in Fig. 5, are the following:

1 180-ton 60-in. Wood hydraulic punch and shear.
1 130-ton 60-in. hydraulic sectional flanging machine.
1 1100-lb. Bement-Miles steam hammer.
1 10-in. Long & Allstatter horizontal punch, 7½-hp. motor.
1 250-lb. Bement-Miles steam hammer.
2 2 ft. 10 in. by 14 ft. hearth open forge fires.
1 2 ft. 10 in. by 6 ft. hearth open forge fire.
1 4 ft. 3 in. by 6 ft. hearth reverberatory forge furnace.
1 10 ft. 6 in. by 15 ft. 6 in. hearth reverberatory plate heating furnace.
3 blacksmith forges.
1 24½-in. motor driven blast fan and pipe connection to forges.
1 cast iron plate straightening bed and roller.
Complete set of cast iron forming blocks, dies, &c., to suit the special requirements of the type of boiler built by this company.
4 3-ton Curtis traveling cranes.

All the small traveling cranes in both shops on adjacent parallel tracks overhang their runways far enough so they can be locked together and the trolley run from one to the other. All the steam, hydraulic and air pipes and electric wires are brought over from the power house in covered trenches, and are so arranged that they can be easily drained in cold weather to avoid all danger of freezing. The air pipes have numerous connections at convenient points throughout the main shop, flange shop and machine shop.

Equipment of the Power House.

The boiler plant consists of three Heine boilers of 250 hp. each, set separately. Two are provided with Heine superheaters of two different capacities. They are all fired by hand and have flat shaking grates. Back of the bridge walls of each furnace is a special firebrick wing wall construction for the prevention of smoke, and it accomplishes the object very satisfactorily. One boiler has a concrete setting with firebrick lining. This was tried as an experiment to determine the availability of concrete construction for this purpose and with the expectation that it will be more durable than brick and less liable to the cracking to which all brick settings are subject. The three boilers each differ from the others in dimensions, and all are arranged so that measurements and observations of all kinds may be conveniently made.

The company has in view a great variety of experiments to determine questions now in doubt and to develop further improvements in boiler practice. This will account for the boiler capacity being out of proportion to the rest of the plant. One boiler will easily carry the load. A straight horizontal sheet iron breeching connects the boilers with the chimney. This is a reinforced cement chimney 66 in. inside diameter and 147 ft. high. The foundation for it is 11 ft. deep and 22 ft. square at the base, a concrete monolith.

As the power requirements are not great, the installation of automatic stokers and coal and ash handling machinery was not deemed expedient. A Hoppes exhaust steam feed water heater with a capacity of 15,000 lb. of water per hour is placed on an iron support against the division wall. The air supply for the compressor is brought from the roof through a 12-in. sheet iron duct to an air washer placed behind the boilers. A small duplex steam pump delivers water from the cistern to the heater, being regulated by a Fisher governor. A boiler tester of the injector type supplies hot water under the required pressure for the hydrostatic test applied to all boilers before shipment. This testing can also be done by pressure from the hydraulic system, and through proper connections by the boiler feed pumps. An injector for feeding the boilers is provided for the use of the night watchman in order to avoid running the pumps.

The electrical energy is developed by a 162-hp. four-valve noncondensing Ball engine, 13 in. by 18 ft., running 200 rev. per min. A 100-kw. 220-volt three-phase 60-cycle Western Electric Company's generator is directly connected to the engine. A 11-kw. exciter is belted to a pulley on the engine shaft. The voltage is maintained constant by a Tirrell regulator mounted on the switchboard.

A Laidlaw-Dunn-Gordon two-stage compound noncondensing air compressor is next to the engine. It has 12½ and 22 in. steam and 22½ and 14 in. air cylinders, with 18-in. stroke. Its capacity is 1200 cu. ft. of free air per minute at 100 lb. pressure when running at 145 rev. per min. 145 lb. steam pressure.

A Worthington duplex compound noncondensing pumping engine, with 14 and 22 in. diameter steam and 4-in. diameter water cylinders, 18-in. stroke, supplies the hydraulic system. Its capacity is 100 gallons per minute against 1500 lb. pressure, with 145 lb. steam pressure. A Wood hydraulic accumulator, 12-in. diameter of ram and 15-ft. stroke, loaded to give 1500 lb. pressure per square inch, is located in one corner of the room. It is connected with an automatic controlling valve which shuts off the pump when the limit of lift is reached.

A 700 cu. ft. Norwalk air compressor, an old machine from the old shop, is intended for emergency use.

Two 7½ x 4 x 6 in. Blake duplex outside packed plunger feed pumps are placed against the partition oppo-

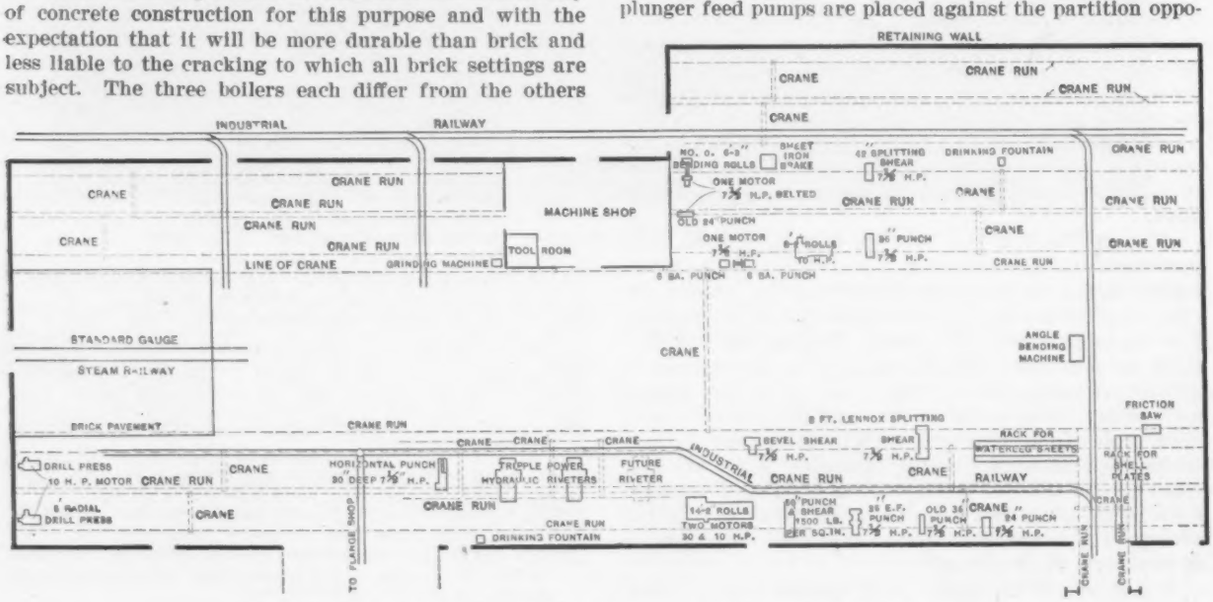


Fig. 4.—Plan of Main Shop, Showing Craneways and Arrangement of Tools.

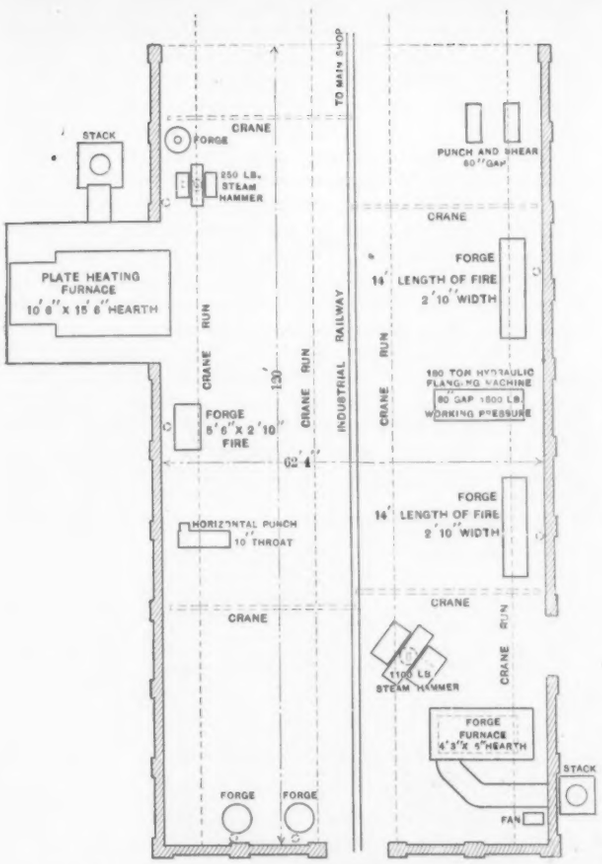


Fig. 5.—Plan of Flange Shop, with Location of Tools.

site the heater and are controlled by Fisher governors. The feed piping is in duplicate and so arranged that any boiler can be fed independently of the others and of the other pump. This is to permit the testing of any boiler without interfering in any way with the operation of the plant.

A 10-ton Pawling & Harnischfeger hand power traveling crane, with 33½-ft. span and 17½-ft. lift, serves the entire area of the engine room. Only the live steam pipes are exposed in this room, all others being laid in covered trenches.

Lighting and Heating.

Artificial lighting is mainly by 10 flaming arc lights uniformly distributed throughout the shops. They are hung to clear the cranes in monitor and bays, and in the latter are about 22 ft. from the ground. The engine and boiler room have each one lamp of the same kind. In addition each machine tool has one or more incandescent lights near the workman. Special six-light incandescent fixtures are recessed in the walls 10 ft. from the floor around the sides of both engine and boiler rooms, with switches in closed hand high pockets. The water and steam gage of the boilers each has a light on separate circuits for each boiler. No outside current is used for either lights or power, except for two arc lights for night use and for the office.

A boiler shop requires heating only in comparatively cold weather, say when the temperature falls below 45 or 50 degress F. It is therefore unnecessary to heat it above that temperature at any time. Open salamanders, usually without means for carrying off the gases of combustion, is the plan most often used, but a better plan from every point of view has been adopted in this shop. The main shop is provided with a sort of hot blast system, consisting of five sets of inclosed coils of ¾-in. pipe, each containing about 3000 sq. ft. of radiating surface. A motor driven fan forces the air through the coils, discharging directly into the room in an opposite direction from the intake. These sets are distributed so as to give the greatest heating effect where needed. Exhaust steam is used, but whether there will be sufficient and whether the system will be satisfactory are yet to be determined. The machine shop and toilet house and office are heated by direct radiators. The flange shop needs no special heating, the fires there being ample.

Special Drinking Fountain.

To provide cool drinking water in summer a special drinking fountain, Fig. 6, was designed, of which two are installed. This consists of a concrete lined pit about 4 x 6 x 3 ft. deep, divided into two compartments, one 27 x 27 in., the other 18 x 37 in. The walls of the larger, which is the ice chamber, are built with air spaces. Near the bottom is a horizontal coil of 1¼-in. galvanized pipe, with a wooden grating above to hold the ice. A drain, the bottom of which is 2 in. above the top of the coil, carries the warm water into the other compartment, in which are the valves for shutting off the supply, &c., and from which all waste is drained into the drainage system leading to the cistern. Over this latter compartment is the hydrant, with a suitable waste pipe and perforated cover. About 300 lb. of ice can be put into the chamber, which is covered with both a thick wooden and an iron lid. In hot weather the supply of ice lasts two days. Water from the city mains is used exclusively for drinking.

Although the buildings are free from fire risk to such an extent that it is considered unnecessary to carry insurance, there is more or less inflammable material around, in the shape of boxes, barrels and other packing material, as well as wooden railroad cars. A simple fire system was therefore installed.

Costs.

The actual construction was purposely undertaken at a time of business depression. Early in 1908, when materials were at their lowest prices, it was therefore determined to proceed. The grading was done in June and July, 1908. A little more than 18,000 cu. yd. of earth was excavated at a cost of 16 cents per yard. The steel work, amounting to about 790 tons, was furnished by the Riter-Conley Mfg. Company at the rate of practically 2.6 cents per pound, f.o.b. St. Louis. The erecting of the steel was done by the Midland Erection Company at $8.80 per ton. The general contract for the completion of the main shop, flange shop and power house was executed by the Fruin & Colnon Contracting Company. The total cost of these

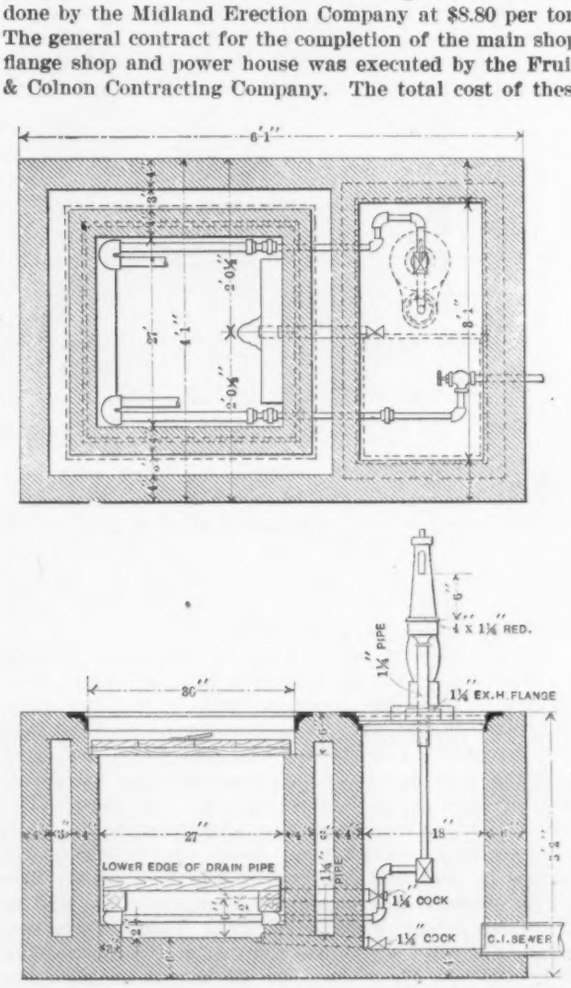


Fig. 6.—Plan and Section of Drinking Fountain and Arrangement for Water Cooling.

buildings was $1.15 per square foot of floor area, excluding the retaining walls and grading, and $1.29 including those two items. This, of course, does not include any of the equipment.

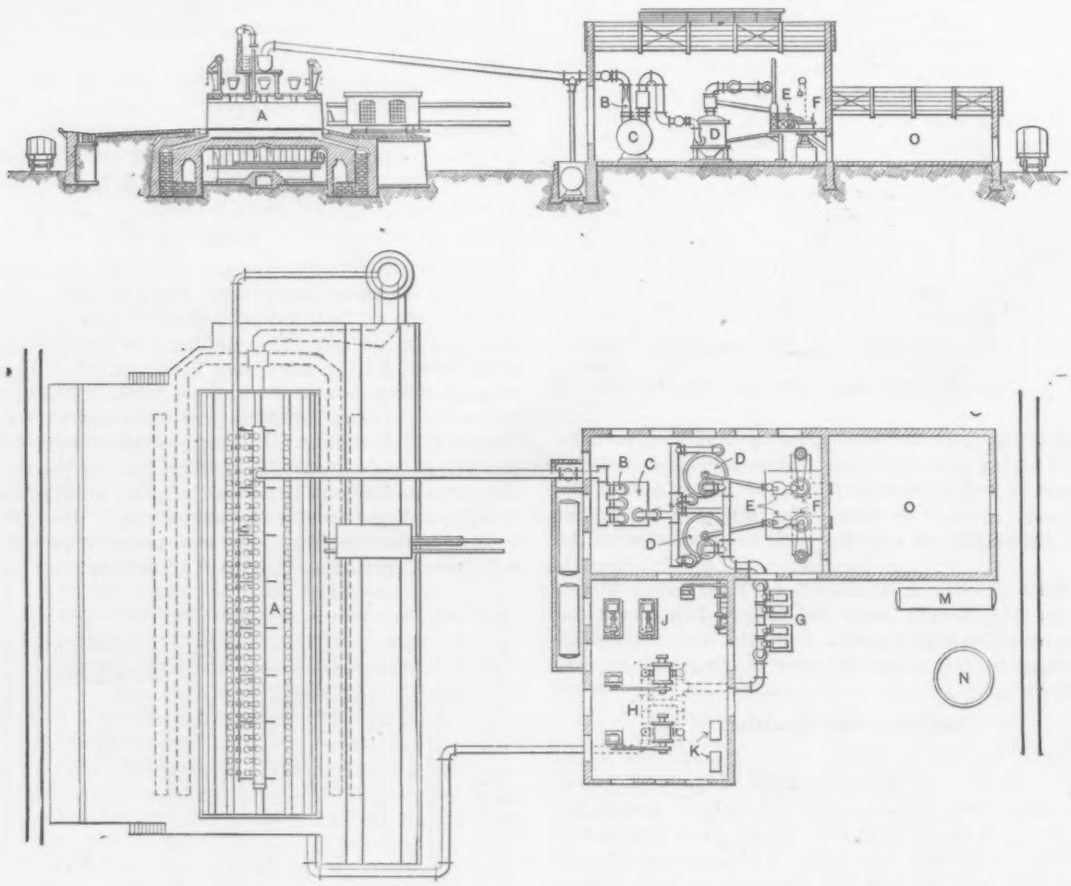
Direct Production of Ammonia from Coke Oven Gas.

G. Hilgenstock, Dalhausen, Ruhr, Germany, has an article in *Stahl und Eisen* for October 20, 1909, on "The Direct Production of Ammonia from Coke Oven Gas." The following is an abstract, with two of the illustrations used:

The winning of nitrogen in the form of ammonia from coke oven gases was concomitant with the preparation of phosphorus in useful form for agricultural purposes. The method laid down by Dr. Otto in 1884, while improved and simplified, still depends upon five distinct stages: First, the cooling of the gases by the air and water circulation; next, washing the gases with cold water to remove the last traces of tar and ammonia; then separation of tar and ammonia water in large tanks, through their specific gravities; then the driving off of the ammonia by steam and added lime; finally, the condensation of the ammonia into a strong solution or elsle combination with an acid, making a salt.

This roundabout method has been and is used because we have not developed a shorter one. It would seem possible to take the ammonia vapor as it comes from the ovens, diluted only by gas, into an apparatus, and there complete the operation. This supposition was based upon the working of the steam jet, and the knowledge that tar itself is the best solvent for tarry vapor. Experiments along these lines gave surprising results when the precaution was taken not to let the tar exceed 175 degrees F., and that no condensation took place. The tar for washing was introduced by a steam jet, and at the works where these trials were made it was perfected to a point where less than 45 grains remained in every 1000 cu. ft. of gas. Credit should be given the firm of Franz Brunck, which as early as five years ago passed the coke oven gases directly into concentrated sulphuric acid, this at temperatures precluding condensation. However, many difficulties were encountered, and the high temperatures and lack of solvents for the tar remained a detriment to the process for a long time. Other methods involving several stages could have been applied, but the one described herewith has given perfect satisfaction. Experiments have shown that the very small quantities of condensation products which separate out with the tar contain practically only ammonia salts, and these are returned to the gases in the saturation chamber with the steam. Where there are occasional abnormal quantities of condensation products, as for instance with very wet coal for coking, provision is made to separate these gases from the drier ones.

The first installation using the "direct method" for ammonia is in operation at the Julia Colliery of the Harpener Association. Here the usual troubles of a newly introduced process were met with and overcome. Even here from the very first a perfectly white sulphate of ammonia was obtained. It had over 25 per cent. ammonia and only a few tenths free acid. The next installation was at the Vondern Colliery, where everything has worked smoothly from the start, the salt after centrifuging being perfectly white and containing 25.26 per cent. ammonia, and 0.20 per cent. free acid. After a short storage it becomes perfectly odorless.



Figs. 1 and 2.—Plan and Elevation of an Installation for the Direct Production of Ammonia from Coke Oven Gas.

The accompanying illustrations give a plan and elevation of a "direct" method installation. A shows the coke ovens. In the tar jets B a very intimate mixture of the tar and gases takes place, so that when the tar catch basins C are reached the gas is free from the tar. The tar pumps J supply the jets continuously and the product caught in C is carried into storage tanks. The hot gases, after the tar separation, and containing all the water vapors and ammonia, are led into the absorption tanks D, which are closed, and in which there is the necessary sulphuric acid. The reaction between ammonia and acid is sufficient to keep the temperature up to a point giving proper results, the sulphate of ammonia drops to the bottom after sufficient saturation, and is carried upon the draining platform E by means of an ejector in the usual way. The centrifugal machines F dry it, and it is then carried to the storage O. The

mother liquor from the draining platform is returned directly to the absorption tanks.

The gas is now dried, passing through the condensers G, fed by pumps K in the usual way. The gases pass to the benzol extraction apparatus and thence to the coke ovens for firing, or else into gas tanks for city lighting. At M is the acid tank and at N the tar shipping tank.

The advantages of the "direct" process are obvious. The washing and distilling apparatus is done away with, steam is saved, settling ponds and removal of slimes are no longer necessary and the operation is simple and cheap.

The General Motors Company.

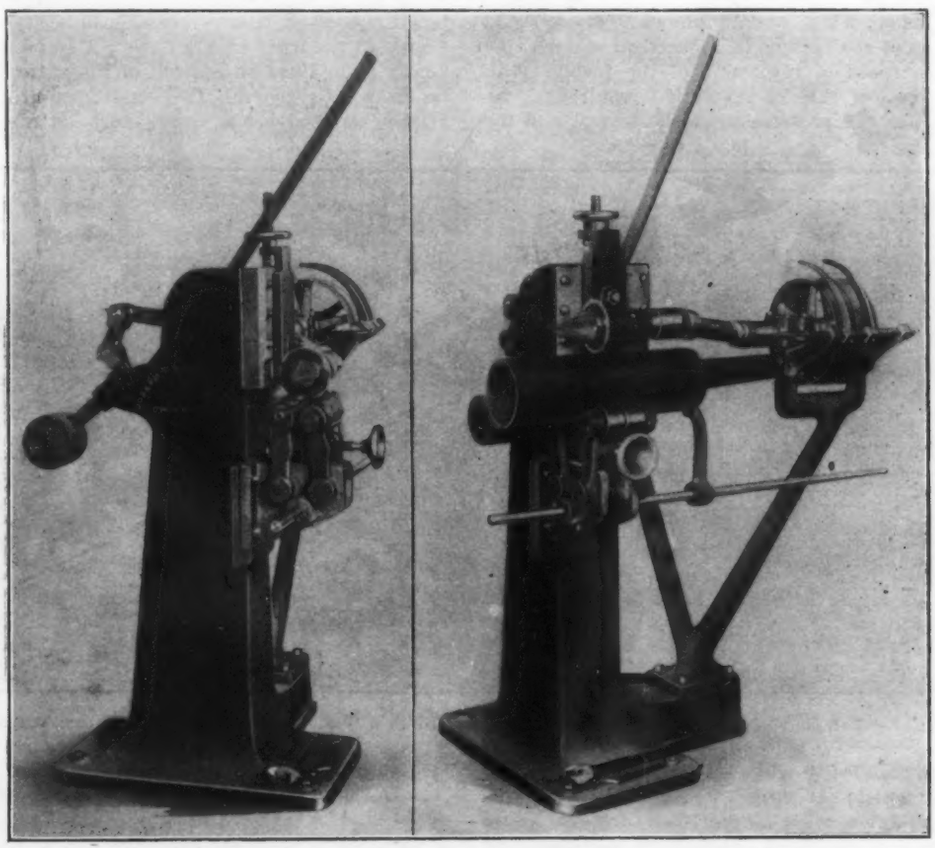
The General Motors Company, Detroit, Mich., has completed the purchase of 50 acres of land in the northeastern part of that city for a great central plant, which will represent an investment of $2,500,000. It is understood that this plant will cover several city blocks, and when completed will have about 100 acres of floor space, making it the largest automobile manufacturing plant in the country. It will be known as the Central Detroit plant of the company.

The General Motors Company controls the Cadillac factory in Detroit, the Welch-Carter, Oakland, Reliance and Rapid Motor Vehicle factories in Pontiac, the Buick factory in Flint and the Oldsmobile factory in Lansing. It is stated in connection with the plans for the new Detroit plant that this is not to be a consolidation of the factories already controlled, but is to afford larger facilities for the manufacture of the popular cars controlled by the company.

The property which has been purchased in Detroit is occupied at present by a number of buildings, but during the winter these will be vacated and they will be removed so that construction can begin early in the spring. The new buildings will be fireproof, of reinforced concrete, brick and steel. The following is a list of the buildings to be erected according to the present plans of the company: Administration building, 90 x 296 ft., three stories; central machine building, with two wings, 90 x 256 ft., three stories; central pavilion, 90 x 436 ft., three stories; saw-tooth section, 206 x 256 ft., one story; assembling plant, 90 x 1000 ft., three stories; two assembling plants, 90 x 700 ft., three stories; warehouse, 263 x 290 ft., two stories; wood shop, 90 x 290 ft., three stories; wood shop, 90 x 256 ft., three stories; wood shop, 300 x 256 ft., one story; paint shop, 90 x 550 ft., three stories; foundry, 180 x 780 ft., one story with monitor roof; power house, 90 x 150 ft., one story.

The Ryerson Flue Cutting Machine.

A substantial machine for cutting pipe or tubes of sufficient capacity to handle the general range of work requiring a small floor space and simple enough to be operated by unskilled help, has been developed by Joseph T. Ryerson & Son, Chicago, Ill. Several of these machines are now in use in a number of the leading shops. The machine, two views of which are given, is practically noiseless in operation, and is capable of very quickly cutting tubes or pipes of from ⅜ to 6 in. in diameter to any desired length.



Two Views of a New Pipe and Tube Cutting Machine Built by Joseph T. Ryerson & Son, Chicago, Ill.

The cutter wheel is directly connected through a knuckle joint shaft to a 12 x 3 in. pulley, intended to run at about 200 rev. per min. The knuckle joint drive permits the tubes or pipes to be run out back of the machine so that they may be cut to any desired length. The cutter is fed by the hand lever shown; the balance weight is provided to secure an automatic release. The lever is so balanced that but very little pull upon it is required to cut tubes of any size. The rollers on which the tubes revolve can be brought close together or spread apart quickly to the proper distance for taking care of various sizes of tubes or pipes.

For reaming out the slight burr from the inside of the tube, which is sometimes caused by the cutting wheel, a fluted reamer is attached to the end of the shaft, as shown. This reamer will ream tubes up to and including 3 in. in diameter. A large reamer for tubes of greater diameter can be furnished and attached to the opposite end of the shaft outside of the end bearing box.

Each machine is furnished complete with one cutter wheel 4½ in. in diameter, a fluted reamer for handling tubes up to 3 in. in diameter, and the wrenches. It weighs approximately 825 lb.

The Melville-Macalpine Steam Turbine Reducing Gear.

Announcement was made in these columns November 16, 1909, of the completion at the shops of the Westinghouse Machine Company, East Pittsburgh, Pa., of the first model of the marine steam turbine reducing gear jointly developed by Rear Admiral George W. Melville, U. S. N., retired, and J. A. Macalpine, formerly of the Navy. Details of this gear have since become available through a pamphlet printed for George Westinghouse, who may properly be called the father of the device, since it was at his instigation that Rear Admiral Melville and Mr. Macalpine first interested themselves in the problem of more satisfactorily adapting the steam turbine to ship propulsion. The report upon their investigations presented by these engineers in May, 1904, was rather qualified in its enthusiasm over the advantages of marine steam turbines, as may be judged by their conclusion, which was as follows: "If one could devise a means of reconciling, in a practical manner, the necessary high speed of revolution of the turbine with the comparative low rate of revolution required by an efficient propeller, the problem would be solved, and the turbine would practically wipe out the reciprocating engine for the propulsion of ships."

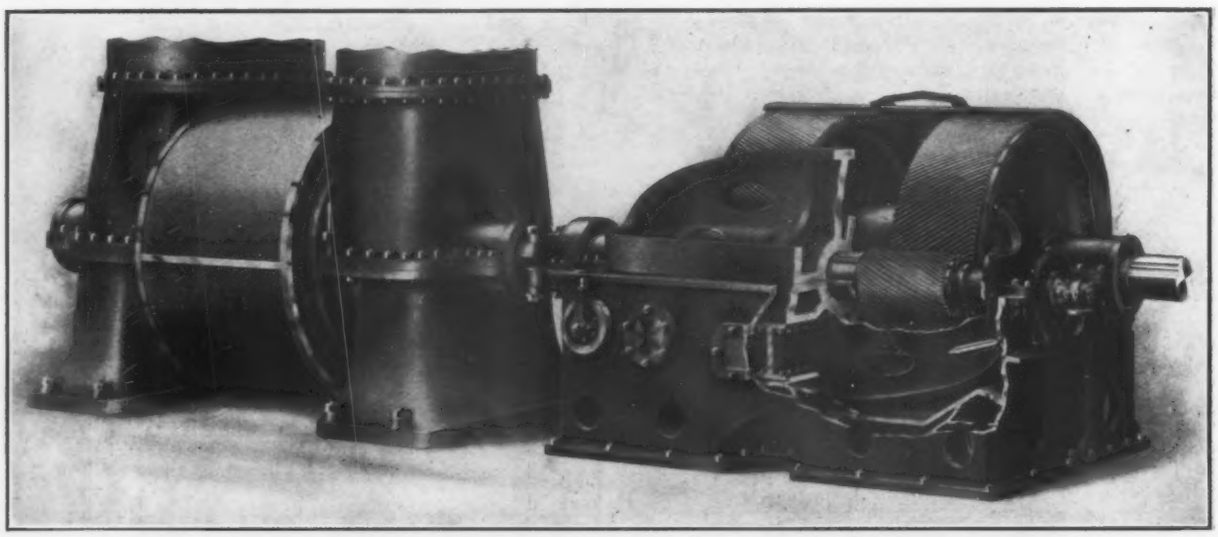


Fig. 1.—The Melville-Macalpine Reducing Gear Connected to a Westinghouse Double Flow Steam Turbine.

Some years later other authorities such as James Denny of Denny & Brothers, Dumbarton, Scotland, and Hon. Charles A. Parsons, the inventor of the turbine bearing his name, suggested the solution of the problem by the use of gearing. This might seem a simple and most obvious proposition, until it is remembered that the consideration of materials and dimensions enter in as they never have before when it is necessary to transmit several thousand horsepower, as in the driving of huge steamships. Simple as the principles still remain, the mechanical details that have made a gear of its size possible show how thorough has been the study necessary before the ingenius expedient of a floating alignment of the gears was hit upon. Even with the most perfect design and workmanship it is hardly possible that the gear could have been a success without this feature, for reasons which will be explained later. The gear makes possible any reasonable speed ratio between the turbine shaft and the propeller shaft.

The detailed description, given later, draws largely from an article printed in *Engineering* (London), September 17, 1909, based on data supplied by the inventors. Before taking this up, however, and for the benefit of those who do not care to enter too deeply into the theory of the matter, the following simple explanation of the device is given in the words of Mr. Westinghouse:

"The teeth of the gears are helical; that is to say, they do not run straight across the face of the wheel parallel to the axis, as in the case of ordinary spur gears, but they are cut in the form of a steep spiral, like an exaggerated screw thread. This construction allows the teeth to roll into contact without shock or jar. If there were only a single gear on each shaft this helical form of tooth would cause an objectionable end thrust. As the gears must be very wide to transmit the enormous power required in marine service, two gears, each of half the required width, are placed on each shaft, with the spirals of the teeth running in opposite directions. In this way the end thrust due to the obliquity of the teeth is completely balanced. With a pair of wide faced gears with straight teeth, it is hardly possible to cut the teeth with such accuracy and to align the shafts so perfectly as to get uniform contact throughout the entire length. Even if it were possible to secure the requisite degree of accuracy at the outset, it could not be permanently maintained on account of the natural wear of the bearings. In general, the conditions are such that a rigidly confined set of gears such as are common for moderate speeds and powers is altogether inadmissible.

"In the design which has proven its sufficiency under severe and exhaustive tests, the smaller gear or pinion is mounted in what the inventors call a 'floating frame.' The frame which carries the bearings for the pinion is a heavy steel casting supported only at a single point midway between the bearings. This support is flexible so that the frame is free to oscillate in a vertical plane passing through the axis of the pinion, but is held securely against motion in any other direction. Furthermore, the pinion is free to move endwise in its bearings. Any tendency of the teeth to bear harder at one end of the gear than the other would tend to unbalance the respective end thrusts due to the right and left hand spirals of the teeth; but as the pinion cannot present any resistance to unbalanced end thrust, it constantly adjusts itself in the direction of its axis to the position corresponding to equilibrium between the opposing forces. This means that the tooth contact pressures are always automatically equalized.

"If there are any minute irregularities in the spacing of the teeth which would tend to make the contact harder at one point than another in any part of the revolution, this tendency is defeated by the floating frame, the position of which about its central support or fulcrum is controlled solely by the pressures of the teeth of the pinion against the teeth of the large gear. Naturally the floating frame always yields under the slightest tendency of an unbalanced contact pressure in such a

way as to transfer the smallest increment of unbalancing pressure to another section of the gear, that in the absence of the floating frame would be less inclined to take its full share of the stress. In short, the gears are self-adjusting to relieve and equalize all abnormal strains and are consequently independent of the small inaccuracies that are impossible to eliminate in the best commercial manufacturing operations."

The Experimental Reduction Gear.

The apparatus as constructed and tested at the Westinghouse Machine Company is a double helical spur gear, intended to transmit 6000 hp. at 15,000 rev. per min. of the pinion, the ratio being about 5 to 1. Fig. 1 shows a view of the gear with the casing partly broken away to expose the mechanism, and the floating frame also partly broken away to show the pinion. Fig. 2 shows the gear in plan, and front and end sectional elevations. The forgings for the gears were made at the Krupp Works in Essen, Germany, and the teeth were cut by Shuchardt & Schütte, Chemnitz. The remaining parts of the gear were made by the Westinghouse Machine Company. The pinions have 35 teeth each and the large gears 176. A hunting cog is introduced to equalize the wear. The pitch is 1¼ in., and the pitch helices are at an angle of 30 degrees with the axis of the shaft. One pinion and gear have right hand helices, and the other left hand, to eliminate end thrust. The diameter of the pitch circle of the large gears is 70 in. and of the pinions 14 in. A small pitch was considered essential if a reasonable absence of noise was to be secured, and this necessarily meant broad teeth in view of the fact that 6000 hp. was to be transmitted with a pitch line speed of very nearly 100 ft. per second (15,000 rev. per min. of the pinion), and with a limit of pressure of 453 lb. per lineal inch on the teeth.

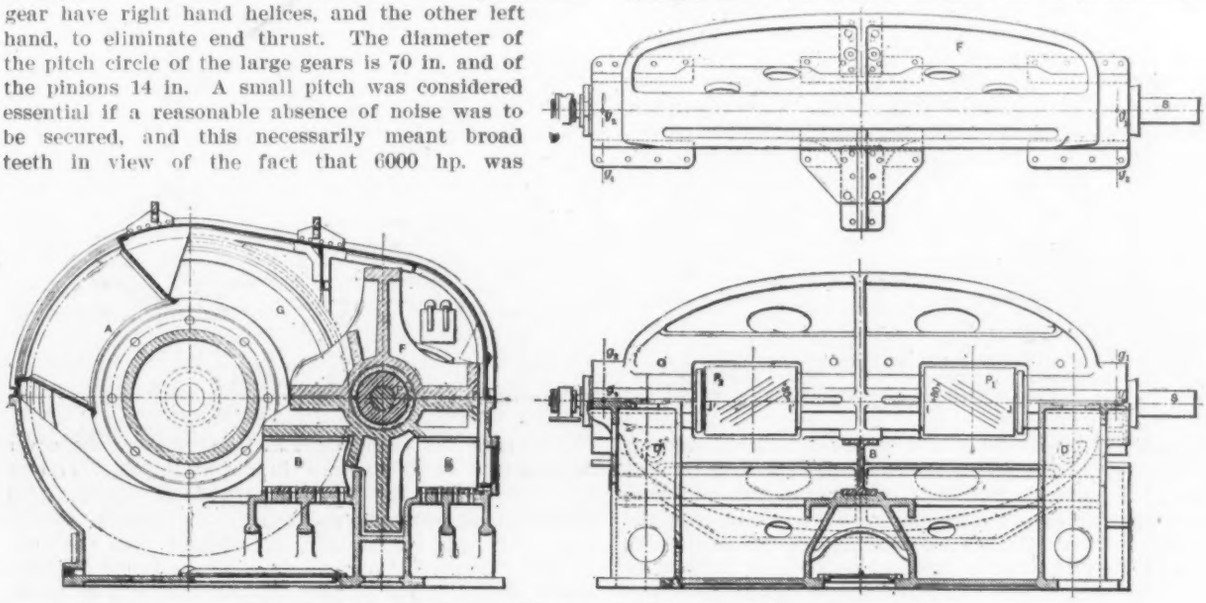


Fig. 2.—Plan and End and Side Sectional Elevations of the Reducing Gear.

As has been before intimated the floating frame in which the pinion shaft is mounted is the interesting feature. Its purpose is to cause the alignment and position of the shaft to be controlled wholly by the interaction of the teeth in action, and not to depend in any measure upon the skill of the workman in laying out and fitting the bearings. Even if these were exactly right to start with they could not be depended upon to remain permanently in alignment. The floating frame, designated by the letter F in Fig. 2, is a heavy steel casting flexibly mounted in the gear box, and supporting the pinion shaft in rigid bearings, but in such a way as to allow this shaft to have a slight longitudinal freedom, so that it can slide axially within the frame. The elevation in Fig. 2 of the floating frame shows the flexible I-beams on which it is supported from the bed plate. The pinion shaft is supported in three bearings, the center one between the two pinions P_1 and P_2, of which P_1 is right handed and P_2 left handed. The large gear shaft being much stiffer requires only two bearings. The floating frame is very deep vertically so as to be exceedingly stiff to withstand deflection by the nearly vertical forces at the bearings. It is also amply stiffened in the horizontal plane to obviate deflection from the weaker horizontal forces.

Fig. 3 shows the pinion shaft and the flexible shaft S by which it is driven. At the end of this shaft is a coupling, C, driven by the turbine shaft T. The axes of the gear and pinion are horizontal and parallel to one another when everything is in correct adjustment. The I-beams B are substantially a hinge, and if the large gear G was not in place, nor the coupling C connected, the axis of the floating frame and pinion could easily be deflected in the vertical plane through a small angle by a slight flexure of the webs.

The coupling consists of two flanges, C_1 and C_2, mounted on the shafts T and S, and connected by two transverse links, L_1 and L_2, and by a center pintle. The shaft T can only rotate the shaft S through the links L_1 and L_2, but as these are transverse no longitudinal forces can be transmitted. Even when seriously out of adjustment the longitudinal forces are so small as to be negligible. The pinion shaft, therefore, is freed to move endwise in its bearings. Further, it is driven by the shaft S, which passes completely through to the end distant from the coupling, where it is keyed and bolted. This shaft is so flexible that it imposes practically no constraint on the pinion and floating frame, such as would prevent slight angular yield of the I-beams B. It is evident, therefore, that, both as to its longitudinal position in the floating frame and in the angular position of its axis, the pinion shaft is solely under the control of the forces transmitted by the teeth of the large gears.

Neglecting the very slight friction of the well lubricated teeth, the total forces at the tooth contacts, indicated by B, E and B′, E′, Fig. 3, will be nearly at right angles to the teeth at B and B′—that is, they will be at 30 degrees to the vertical. Hence the two parallelograms of forces shown will be similar. The horizontal forces at B D, B′ D′ are the only axial forces acting on the pinion. If these are not equal the pinion will at once shift longitudinally, which it is free to do, till they are equal. The two parallelograms of forces then become equal to one another in every respect and the vertical force B F is equal to the vertical force B′ F′, but besides this longitudinal movement of the pinion the frame in which it is mounted is free to rotate about the center point O by flexing the I-beams. Hence it follows that the moment of the vertical force B F about O must be equal to that of B′ F′ about the same point, and as B F equals B′ F′, the arms of the lever O B and O B′ must be equal. Thus it is claimed not only that the total forces on the teeth P_1 and P_2 will be equal, but the distribution will be so similar that the centers of pressure B and B′ will be similarly placed. Thus a good distribution of pressure is practically insured under all conditions of load.

If the axes of the gears are parallel to start with the action of the teeth will, it is claimed, force the axis

of the pinion into exact alignment with that of the large gear, provided that in the flexure of the I-beams supporting the floating frame the pinion shaft tilts in a vertical plane parallel to that containing the axis of the large gear. If there were no floating frame, and all bearings of the pinion and gear were cast in one bed plate, the longitudinal dimensions remaining unchanged, an error of alignment of the axes in the vertical plane not exceeding 1-1000 in. in the length over the bearings would entirely upset the uniform distribution of the pressure along the faces of the teeth. Hence, with the most careful work, the above assumptions may not be fulfilled with sufficient accuracy. Even if they were exactly fulfilled when the gear was first completed, inequality of the side wear of the bearings might cause the axes to stand at a sensible angle in the horizontal plane.

Such errors of alignment may be measured outside of the end bearings of both the pinion and gear, as g_1, g_2, g_3 and g_4, in Fig. 2, by vertical and horizontal gauges placed so that errors of alignment can be readily measured when the gear is running. If the horizontal gauges at g_3 should show the axes too close by, say 1-10 in. and those at g_4 should show them too open by 1-10 in., giving a total error of alignment of 1-5 in. in the length between the gauges, with involue teeth, which are here used, they will bear hard at I and I′, Fig. 2, and lightly at J and J′. If the teeth were perfectly rigid there would, of course, be point contact at I and I′, and the teeth would actually stand open by a small amount at J and J′. This opening is called the opening of contact. If in changing from perfect alignment the pinion turned about either a vertical or a horizontal transverse axis the opening of contact would be a considerable fraction of the sum of the errors shown by the end gauges. On the other hand, the action of the floating frame in combination with involute teeth is such as to constrain the pinion to turn about an axis parallel to the line of action of the teeth, in the present case an axis inclined 14 degrees 30 minutes to the vertical, and this is the movement which reduces the opening of contact to a minimum. In tests the extreme opening of contact has been shown to be 1-6500 in., and this for a gauge error which should never be approached. At half this gauge error, still large and easily measurable, the opening of contact is reduced to one-quarter of the foregoing, or 1-26,000 in., a quantity far below the limit of accuracy of the very finest machining. The yield of the teeth and shafting would be enough to close up considerably more than this amount of contact opening. Errors of erection will be exceedingly minute, so that the only errors to be avoided are those due to unequal horizontal wear of the bearings. An unequal wear will be compensated for by a slight tilting of the floating frame. As the forces on the floating frame are inclined to the vertical at only a small angle vertical wear will take place much more quickly than horizontal; and as the inequality of the wear will usually be but a small fraction of the total wear, it would almost be impossible for any very sensible angular error in the horizontal alignment to creep in before the bearings are worn down so far vertically as to require renewing.

Involute teeth have been used on account of their property of still running true when the distance between their axes is not exactly that for which they were designed, such as might occur through wear of the bearings or errors in the original setting up. This is not true of any other form of teeth, such, for example, as epicyloidal teeth, as they will not run true if the centers move apart. The elasticity of the I-beams allows freedom of movement with the axis of the pinion and floating frame in the vertical plane, but by warping the webs of these beams the axis of the floating frame might also turn slightly in the horizontal plane; although it is much more rigid against such displacement than against that in the vertical plane, the rigidity is by no means complete. With freedom of rotation both in the vertical and horizontal planes the position of the axis of the floating frame would be unstable. The forces at the tooth contacts would not tend to bring it back to perfect alignment, but with involute teeth would tend to increase the displacement. Therefore, to prevent excessive horizontal errors of alignment the floating frame has been deprived of all freedom of motion in a horizontal plane by two horizontal struts standing transversely between the floating frame and bed plate. These bear on the floating frame at D and D′, Fig. 2, and one is clearly shown in Fig. 1. These struts do not interfere with the freedom of movement of the floating frame in the vertical plane. Where they bear in the bed plate there is an adjusting and locking mechanism which greatly facilitates the true setting up of the floating frame, and is to be seen in Fig. 1 in the front of the bed plate, near the end next the turbine.

The only condition which could cause serious disturbance of the tooth pressures is an excessive heating of the pinion above the temperature of the gear, but as copious lubrication is provided, especially for the pinion, which has more tendency to heat, this danger has been eliminated. Moreover, the cover is arranged so as to draw in air at the ends and at A, Fig. 2, by the fan action of the gears, and discharge it through openings (not shown) to the right of this cross section. Water can be circulated between the pinion quill and the flexible shafts, but it is not anticipated that this will be necessary. With the coefficient of friction at the two contacts 1-10 the frictional loss at the teeth would be under 1 per cent., so that even if the gear were transmitting 6000 hp., the very highest power hoped for, this frictional loss would be under 60 hp. As at least one-half will go to the large gear, where it will readily be dissipated from the large surface, there is left well under 30 hp. to be removed from the pinion, which, with the various means provided presents no difficulty. Therefore, with control of the heat insured there will, it is claimed, be practically perfect tooth contact. This, with the fine pitch and the spiral gears, avoiding sudden entering or leaving contact of one whole tooth at a time, insures reasonably quiet running of the gears.

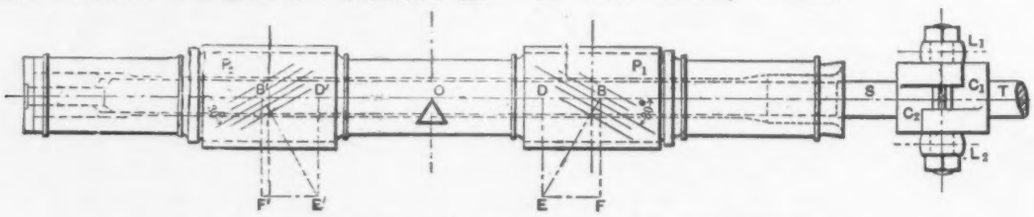


Fig. 3.—The Pinion Quill and Flexible Connection to the Driving Shaft.

Tests.

It was expected that there would be a transmission loss of at least 5 per cent. in the apparatus, but after a few preliminary trials it was found that the efficiency was over 98 per cent., and it became increasingly difficult to measure it accurately. The apparatus for the testing, which it is not the present intention to describe, was, however, modified and developed to suit the conditions and gave the following as the results: At 3712 b.h.p., delivered by the gear, 98.7 per cent. efficiency; at 4156 b.h.p., 99 per cent.; at 4576 b.h.p., 98.9 per cent.; at 5036 b.h.p., 98.7 per cent.; at 5486 b.h.p., 98.5 per cent., and at 5927 b.h.p., 98.7 per cent. efficiency.

Possibilities of the Gear.

What the application of this gear would mean to such large ocean liners as the Mauretania and Lusitania is food for thought. The present turbines of these ves-

sels develop about 70,000 shaft hp. Their comparatively low speeds cause their efficiency to suffer, and at the same time it is still too high for maximum propeller efficiency. Assuming that the propeller efficiency now is 55 per cent., the actual propelling power is only about 38,500 hp. With the reducing gear a propeller should be applicable with an efficiency of not less than 65 per cent., when there would only be required for the same present propelling power 57,000 hp., delivered at the shaft, a saving of almost 15 per cent. This would allow reducing the boiler capacity about one-seventh, saving an enormous quantity of coal on each voyage, as well as affording additional cargo space. At the same time, with the better economy possible with turbines running at a more efficient speed, the boiler capacity could be still further reduced, and the overall efficiency of the installation would be sufficiently improved to result in a reduction of over 35 jer cent. of the coal consumption. If it were not desired to reduce the boiler capacity, with the better economy possible with the high speed turbine and the reducing gear, the speed could be greatly increased.

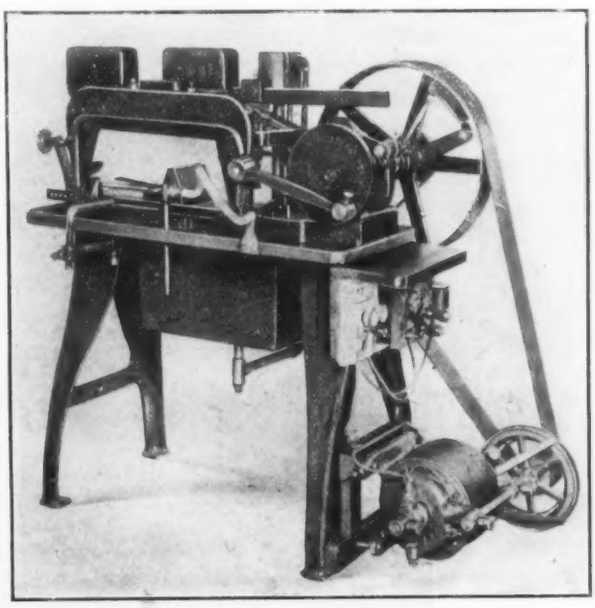
The advantages of the gear to war vessels is even more pronounced, for the passenger steamer normally runs at its highest speed and its maximum turbine efficiency, whereas with battleships or cruisers maximum speed is only an emergency condition. The normal cruising speed is only about 60 per cent. of the maximum speed and requires, perhaps, less than 25 per cent. of the maximum power. It is at the cruising speeds that turbine propelled naval vessels have shown to disadvantage as compared with vessels propelled by reciprocating engines. By using three turbines for propulsion, one alone can drive a center screw for cruising speeds and all three be brought into action for maximum speed, each operated, when running, at its maximum efficiency. The ability to start turbines cold and quickly bring them to full speed is another advantage of great importance in the naval service. It is estimated that with the better steam economy of the high speed turbine the boiler capacity required in a battleship, for example, would be reduced fully one-third, and with the same bunker capacity the radius of action would be enormously increased. Even with no reduction of the boiler plant there would be a saving in weight of approximately one-eighth, due to the use of the high speed turbine and reducing gear in place of the more cumbersome slow speed direct connected turbine. With three independent shafts, each with its own self-contained turbines for going ahead and astern, excellent manoeuvering qualities would be had which are lacking in vessels fitted with the present conventional turbine equipment.

The Racine Motor Driven Power Hack Saw.

An electric motor drive is the latest improvement made by the Racine Gas Engine Company, Racine Junction, Wis., in its power hack saw machine, illustrated descriptions of which appeared in *The Iron Age* for December 26, 1907, and July 2, 1908. The Racine hack saw machine is designed to cut all kinds of material at a saving of time, blades and material and the obtaining of more accurate cuts. Some of the work done by this machine includes the sawing of 70-lb. rails in railroad shops and the cutting of steel gear blanks. Round 6-in. steel bars have been cut in less than 30 min. Lifting the blade clear of the work on the idle stroke makes the blades last longer and several cuts are made by each blade instead of one, as was the case with the older type of machine, where the blade dragged through the work on the idle stroke. Other features which are retained from the earlier models of this machine are the draw cut, which lessens the likelihood of the blades breaking, and a system for circulating a cooling compound on the blade to keep it from heating while making a cut at a high rate of speed. All shapes of material whose dimensions do not exceed 6 in. are easily cut by this machine.

As will be seen from the illustration, the motor is belted directly to the driving pulley, which is large enough to require no intermediate gears. On the idle stroke the blade is lifted clear of the work by a hardened steel ratchet and dog operated by a cam on the main shaft. A countershaft is not required, as the machine is started and stopped by a clutch on the main shaft; this is a friction for high speed work and a positive clutch for the slower speeds. The feed is varied by changing the position of the feed weight on the arm. The cooling compound is forced from the large tank under the machine by a pump, belt driven from the main shaft, into the smaller supply tank, from which it is discharged on the work and drains to the larger tank. An automatic valve in the bottom of the upper tank closes as soon as the cut is finished, and opens again when another is started.

For accurately duplicating work a length and depth gauge is provided, together with an automatic stop that operates when the cut is finished; while measuring the work the saw can be held at any desired hight from 1-16 to 6 in. by the lifting device.



A Motor Driven Power Hack Saw Built by the Racine Gas Engine Company, Racine Junction, Wis.

The construction throughout is very rigid, which helps to secure an accurate cut. The saw guide and frame are both one-piece castings and the latter is provided with means for taking up wear. All the parts are interchangeable, being made to jigs and templates.

The principal dimensions are as follows:

Floor space, inches	17 x 30
Hight over all, inches	40
Capacity, inches	6 x 6
Length of stroke, inches	6
Size of driving pulley, inches	2½ x 16
Speed, revolutions per minute	125
Size of motor, horsepower	1½
Length of main shaft, inches	6¾
Length of hack saw blade, inches	14

C. G. Hussey & Co.'s Expanding Trade.—C. G. Hussey & Co., Pittsburgh, manufacturers of sheet copper and copper specialties, have recently acquired additional real estate adjoining its plant on Second avenue, which will be used for improvements. The firm contemplates erecting a building of concrete construction, 60 x 150 ft., several stories high, in which it will concentrate some of its departments in other buildings, thus effecting economies in manufacture, permitting greater efficiency, &c. C. G. Hussey & Co. have in times past improved their property with new buildings, more modern machinery, &c., but even with their present large capacity they are compelled to operate their plant both day and night. During the last year or so they have maintained an office and carried stocks in New York, and lately complete arrangements toward establishing a representative and carrying stocks in St. Louis and Chicago to supply the Western trade.

Westinghouse Type C Three-Phase Transformers.

The three-phase transformer presents certain inherent advantages of compactness in construction and installation, since it supplants with a single piece of apparatus the equivalent group of three single-phase transformers otherwise required for the same service. The simplicity of connections and the better appearance presented when installed on a pole or elsewhere, have led many to prefer it to the equivalent arrangement of three single-phase transformers. Recent improvements have been made in the type C three-phase transformers, made by the Westinghouse Electric & Mfg. Company, Pittsburgh, Pa., resulting, besides the advantages already enumerated as inherent to this design, in decided advances in both construction and performance. In these transformers the losses are reduced below those of any ordinary equivalent combination for transforming three-phase power, and the apparatus can be sold below the price of the equivalent single-phase transformer group.

These type C three-phase transformers are made in sizes ranging from 5 to 75 kw. capacity, and display very high efficiency at all loads, as well as close regulation when operating on currents having low power factors. These properties of good regulation and efficiency, together with the compactness and simplicity, make these transformers especially adaptable for supplying motor leads. The cast iron corrugated case employed is similar in design to that used in the Westinghouse type S transformer. The three high tension leads enter from the front side of the transformer and the low tension secondaries issue from the pole side of the case. Provision has also been made for bringing out neutral leads when desired from both the high and low tension windings. Separate terminal blocks are provided for both the high and low tension leads of each of the three phases. Each low tension winding comprises two coils, which can be connected in parallel for 110 volts or in series for 220 volts; the standard designs are for 2200 volts on the high tension side. In general the design and construction are developments of the type S single-phase lighting transformer and the transformers are of the same class of material and workmanship.

The Harlan & Hollingsworth New Underframe Shop.

At Wilmington, Del., the Harlan & Hollingsworth Corporation has recently completed a new shop for the building of steel underframes and steel passenger cars. The shop is of an irregular shape about 150 x 180 ft., of reinforced concrete and steel construction throughout, with concrete floors, and is remarkably well lighted. In addition to the side windows, there is a large skylight in the roof. The shop is also amply provided with artificial illumination by Cooper-Hewitt mercury vapor lamps. For the handling of the work and materials the shop is equipped with overhead electric trolleys, of which there are three to each building track. The tool equipment includes air and electric tools for riveting, chipping, cutting, drilling, bending, &c., the shapes and plates entering the construction of steel underframes and cars. Storage tanks are provided for oil fuel and auxiliary air tanks for use in connection with the air tools. Figs. 1, 2 and 3 are interior views in the shop, and Fig. 4 gives a plan and end elevation showing the general form of the building and the location of the industrial railway and railroad tracks and the cranes.

Fig. 1.—A View in the Machine Bay of the New Underframe Shop of the Harlan & Hollingsworth Corporation, Wilmington, Del.

The irregular shape of the shop is due to the location along the tracks of the Philadelphia, Baltimore & Washington Railroad. The work bay and one of the assembling bays, as shown on the plan, Fig. 4, have an even frontage; the other bays are stepped back so that, owing to the curve of the railroad tracks, they may also have the full depth of 180 ft.

The building will be used for constructing and assembling pressed steel underframes for railroad cars. Eight standard gauge railroad tracks run the full length of the shop, one in each bay and two in the construction bay, in which is located the full machine equipment of the shop. The frames during construction are mounted on shop trucks, and on completion are moved to the car body shops and there adjusted to the bodies. The concrete floor of the building is on one level. The tracks are embedded in the concrete, and have concrete foundations. The heating of the building is by steam from a central power station; an underground drainage system carries

the condensed water back to the power plant. To light the shop at night there are 12 Cooper-Hewitt lamps in the machine department and 12 in each of the other bays.

The working capacity of the shop is 12 frames, each bay being able to accommodate two 70-ft. frames. The equipment of the machine bay, nearly all of which is located between the two tracks serving that department, wheels and five portable oil rivet heating furnaces. Air under 100-lb. pressure and 10-lb. pressure for operating hand and power tools is supplied from a central power station. A large tank for maintaining an equal pressure is located in one of the bays, and the air under pressure is distributed by pipes to the different bays. Supply pipes are carried down the different steel columns at convenient

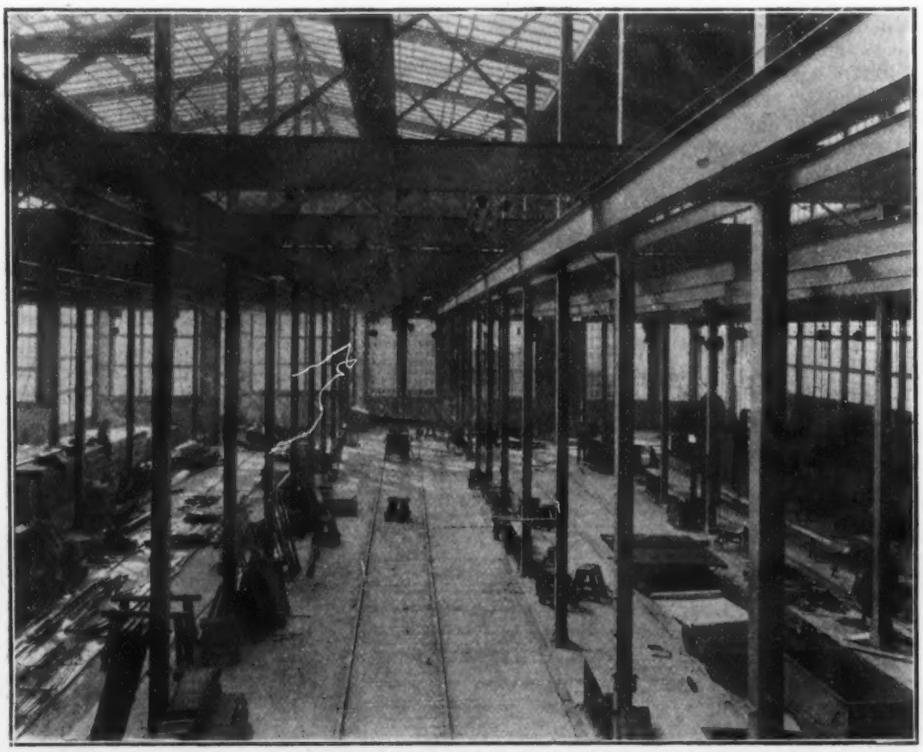


Fig. 2.

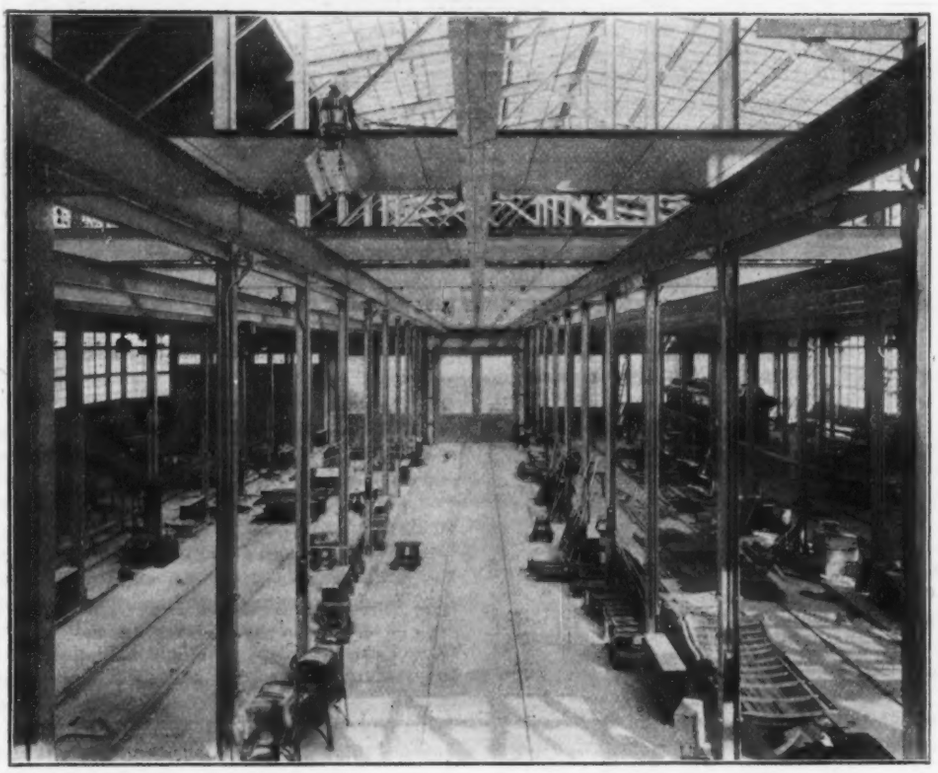


Fig. 3.

Views Looking in Opposite Directions in the Work Bay.

is as follows: Four No. 2 punches, a gate shear, a No. 1 angle shear, a No. 2 bending and straightening machine, a 9-ft. set of straightening rolls (all of the foregoing were built by the Hilles & Jones Company), six drill presses, one Newton I-beam cold saw cutting-off machine, three Pittsburgh and one Caskey portable riveters, emery points, with suitable valves at the outlets where connections by hose are made to the different tools. Each of the machine tools in the shop has independent motor drive.

The overhead hoisting system is interesting; no electric traveling crane is used. Instead, each bay has a sup-

ply of electric traveling chain hoists; these run along I-beam girders, which run the full length of each bay. In the center of each bay two 4-ton Sprague electric trolley hoists operate on one track; the operation of which is controlled from the floor by four hand grips attached to wire cords, operating the forward, backward, hoisting and lowering movements. Two Yale & Towne triplex hand chain hoists of two tons capacity, carried by electric trolleys traveling along the runways, are also located in each assembling bay. In the machinery or construction bay there are two 4-ton Sprague electric hoists, four electric traveling 2-ton hand chain hoists and 10 triplex hand travel and chain hoists, together with two stationary hand hoists.

A main switchboard controlling the current for all operations is located at one end of the building, although separate switches are located in each bay, so that, should one bay be in trouble, it could be cut out without interfering with the general service. The oil tank, complying with insurance requirements, is located outside of the building, and the supply for the rivet heating furnaces is delivered by a hand pump. The pneumatic riveters are carried by the overhead hoists to any point in the machine department or adjoining bay; the riveting work is done by hand tools in the other bays.

The ventilating system in the skylight windows is operated by the Pond operating device, made by the David Lupton's Sons Company, Philadelphia, Pa., by which the whole side may be opened from any point. The erection and assembling bays are approximately 18 ft. wide, and the machine bay is 36 ft. wide.

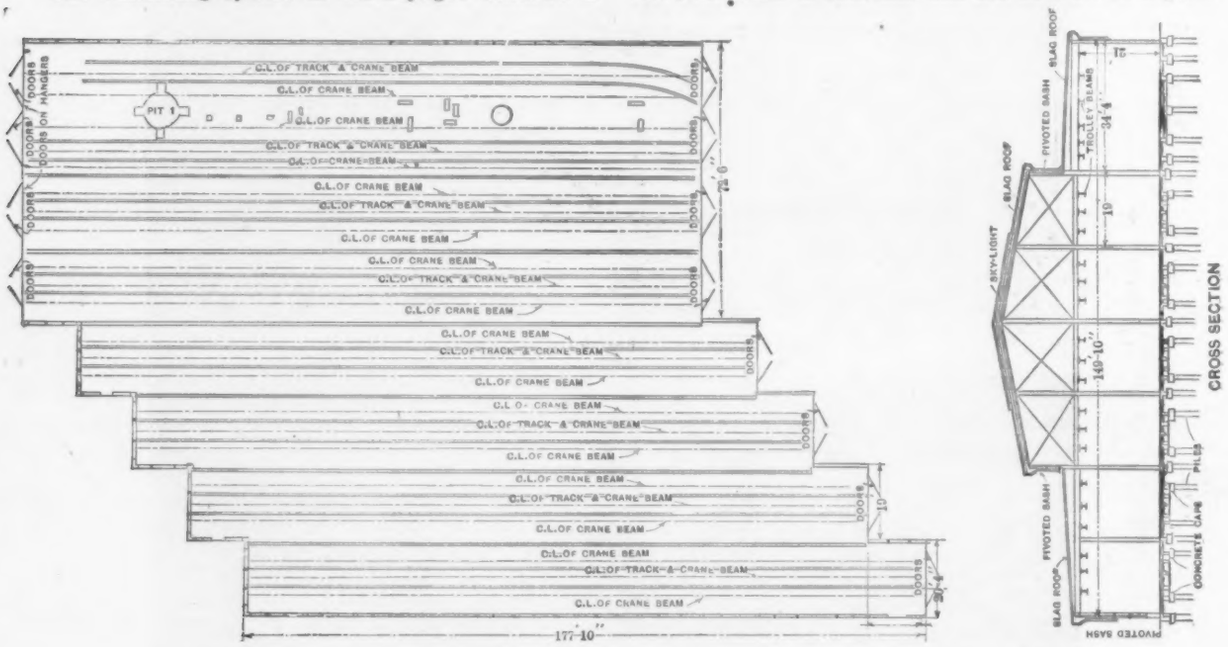


Fig. 4.—Plan and Cross Sectional Elevation of the New Harlan & Hollingsworth Underframe Shop.

Pennsylvania Taxation of Corporations.

HARRISBURG, PA., December 7, 1909.—The Pennsylvania State Legislative Commission, named in accordance with action of the last general assembly to frame a new corporation tax bill to be submitted to the Legislature of 1911, has begun its work by issuing a general letter to all corporations, banks and associations operating under Pennsylvania charters announcing its purposes and asking for suggestions and advice in the framing of a law.

The bulk of Pennsylvania's revenues comes from taxes on corporations. In the growth of companies operating under letters patent many questions of taxation have arisen, and there is a general demand for some changes as well as contention that more revenue should be derived, especially from companies which are operating in natural resources. There are fully 23,000 corporations on the State taxation list, and in the fiscal year ending November 30, 1909, the income from corporations amounted to the following items: Taxes on capital stock, $9,916,840.41; taxes on corporate loans, $2,497,480.81; taxes on corporate gross receipts, $1,520,973.84; bonus on charters issued, $516,265.55. None of these items includes taxes on insurance of insurance companies, on bank stocks or similar items, but represents what the State received from corporations alone. The magnitude of such business can be seen when it is stated that the income of the State for the period mentioned was $29,101,183.70.

It will be the policy of the commission to codify the existing laws and to make such changes as may be needed in existing laws and the method of their enforcement, with recommendation of new ones. After the suggestions are received from the corporations addressed, which will include all iron and steel, coal and coke, quarrying, manufacturing, water, railroad, trolley and other companies, the committee will spend several weeks digesting them and then public hearings will be held in various parts of the State.

The commission is to make its report to the Governor in July of the coming year, and has already gathered the laws relative to taxation of all of the States and of a number of other countries, all of which will be exhaustively considered.

The three subjects which will receive closest attention are taxation of capital stock of manufacturing companies, the real estate of railroads and the business of express companies. These three subjects have been covered in numerous bills presented to the Legislature, in the last five sessions. The capital of manufacturing companies is exempt from taxation where actually engaged in manufacturing, so that all of the big steel companies and other manufacturing corporations will be affected should any such tax be decided upon. The real estate of railroads is also an important item, as millions of dollars of land are not taxed because the contention is made that the railroads pay taxes on capital stock and that the land holdings represent values.

The general belief is that a bill to levy taxes on these items will be framed, but that changes will be made in existing laws which will shift burdens to a certain extent. H.

Tenders for the substructure of the new Quebec Bridge, of which the estimated cost is to be $10,000,000, and which is to be completed in four years, were delivered to the Department of Railways and Canals in Ottawa, November 30. The weight of the superstructure to be carried will be 130,000,000 lb., whereas the weight of the superstructure of the bridge that collapsed was to be but 70,000,000 lb. The cost of the steel in the new bridge is to be about $7,500,000. Nickel-steel is to be largely used. It is expected that tenders for the steel work will be called for about May 1.

The Slick Type of Blowing Engine.

BY S. RICE.

The introduction of the Slick type of blowing engine into furnace practice is another of the forward steps that have been made in the manufacturing processes of steel making. This engine is so designed that a much larger quantity of air can be delivered from a much smaller sized machine than formerly used. In fact, with the Slick tubs, invented by E. E. Slick of the Carnegie Steel Company, only two are needed for the largest sized furnaces, whereas other types require three or four tubs per furnace. This has been accomplished by so designing the tubs that they operate most efficiently in handling the air and at the same time are capable of running at a much greater speed.

The essential features of the Slick design, shown in Fig. 1, may be given briefly as follows: The inlet ports are located in the barrel of the tub and consist of a series of circular openings extending entirely around the circumference of the barrel at each end. The barrel is not attached to the heads, but is supported on independent slides and by suitable connections is made to reciprocate while the heads are held stationary. This construction gives great inlet area for very small motion of the barrel and leaves the entire area of the heads free

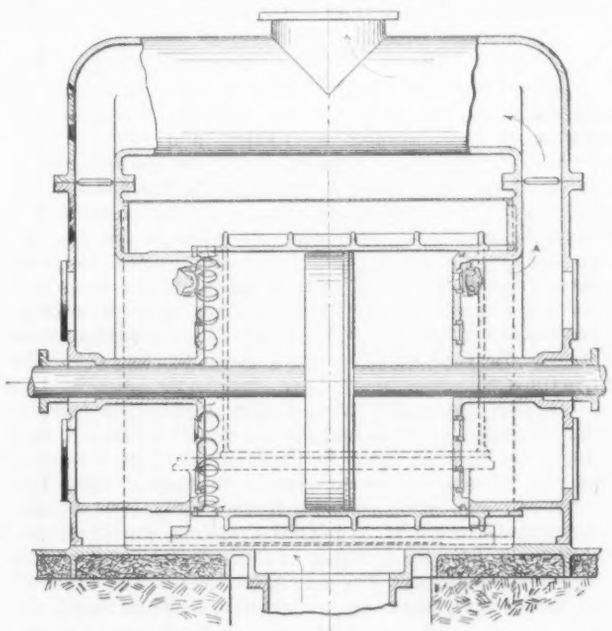


Fig. 1.—Longitudinal Section of the Slick Blowing Tub as Built by the Allis-Chalmers Company.

for discharge valves, making it possible to secure great discharge area.

Indicator cards taken from these engines, an example of which is given in Fig. 2, show that the inlet admits air on the suction stroke with no measurable loss of pressure and that the tubs fill completely. At the beginning of the suction stroke there is a slight drop of the suction line below the atmospheric line due to the slower valve travel at this point. However, as the piston advances, the valve opening quickly increases so that no drop in pressure is apparent. The discharge line rises but slightly above the receiver pressure and this only at the middle of the stroke, where the piston speed is highest. The diagrams taken from these tubs show the nearest approach to the theoretical cards yet obtained in commercial operation.

This type of apparatus was first placed on the market in connection with gas driven blowing engines. These units were twin, direct coupled blowers, with a normal capacity of 15,000 or 20,000 cu. ft. of free air per minute per tub, depending on the size. The design is such, however, that higher piston speeds can be used than in former designs, and the Allis-Chalmers Company is now building the Slick tub in connection with its heavy duty steam blowing engines. Units thus built have a capacity of 25,000 to 30,000 cu. ft. of free air per minute. The piston speeds attained are no higher than the experience of the company has found suitable in Corliss engine practice.

In these blowing engines the gas or steam cylinders are at one end of the frame, while the tub is fastened at the other end. This gives a short and direct drive for the Slick barrel from the engine shaft, and the air piston, by means of distance rods, from the steam cross-

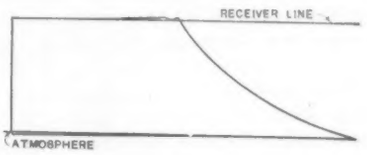


Fig. 2.—Typical Card from a Slick Blowing Tub.

head. The whole machine is made in a very rigid and compact manner.

The air tub heads are designed with unusual depth to provide a drum extension, over which the Slick barrel may lap the amount necessary in the valve travel. Each head is fitted with a cast iron packing ring to prevent leakage between the heads and the moving barrel, and this is the only point of contact which the bore of the barrel has with the heads. This packing ring is an exact duplicate of the one used on the piston. The design is such that these rings can be very easily examined for cleaning or removal by removing one pin in the valve gear and sliding the barrel without in the least changing the valve setting. The Slick barrel is driven by two connecting rods, one on each side, which insures an even drive.

These blowing tubs are usually provided with light automatic steel cup poppet valves, located in the heads and so arranged that the valves will seat against the inner wall of the head and give the minimum amount of clearance. These valves have been successfully used on engines running 150 rev. per min., with noiseless operation. The valves are arranged in groups, with a hand hole in the casing, giving easy access to each group. The piston is carried on an open hearth steel piston rod, which is cambered to compensate for the deflection due to the weight of the piston. The weight of the piston and rod is supported by intermediate and tail crossheads, so that the piston floats without contact with the barrel.

A cast iron wind box is connected to the large rectangular flanged discharge openings from the heads and gives a common connection between the two ends. This has a flanged discharge at the center and top. A substantial sheet steel casing supported from the heads and entirely encasing the barrel can be easily applied. This has a suitable nozzle for connecting the suction piping to the dry blast equipment.

Standard Slick type blowers are designed to operate economically on a blast pressure of from 16 to 18 lb. normal with a steam pressure up to 150 lb. gauge and will easily blow against 30 lb. of maximum blast pressure.

The steam engines supplied with the Slick blowing tubs are the result of the experience gained from both steam engine and gas engine operation. Heavy engine frames, main bearings and running gear characterize the design. The low pressure cylinder is provided with a tail rod supported by a tail crosshead. The design follows closely that practiced by the builder in its heavy duty blowing engines.

The Ohio Society of Mechanical, Electrical and Steam Engineers, at its recent annual meeting held at Lima, Ohio, elected the following officers: President, O. F. Rabbe, Toledo Railway & Light Company, Toledo; vice-president, Grant Miller, Citizens' Lighting & Heating Company, Toledo; secretary-treasurer, F. E. Sanborn, Professor of Industrial Arts and Director of Industrial Arts Department of Ohio State University, Columbus. The next meeting will be held in Cincinnati in the spring of 1910, the exact date being left open for decision later.

The Profession of Engineering.*

Presidential Address 1909.

BY JESSE M. SMITH, NEW YORK.

Great engineering works existed in many parts of the world long before Columbus discovered America. We have but to consider the ruins left by the Incas in South America and the Aztecs in Mexico to realize the great work done on this continent in engineering. In Asia the great wall of China; the temples of Japan, China, Babylonia and Assyria bear record of the presence of the engineer. In Africa, the vast pyramids of Egypt and the temples on the Nile are evidences that great engineers existed long before the Christian era. We marvel still when contemplating the pile of immense blocks of stone forming the pyramids and try to imagine what form of apparatus could have been used in placing those great stones one upon the other. In Europe the Greeks and Romans did marvelous works in roads, bridges, aqueducts and various mechanical structures which the modern engineer may well ponder and admire. While we read much in history of the emperors and kings who reigned when these great engineering works were produced, we learn little of the men who produced them, men whom we now call engineers.

Beginning of Engineering Societies.

While engineers have existed for thousands of years it is only within a comparatively recent time that they have begun to form themselves into societies for their mutual education and the advancement of the profession of engineering. In England, as early as 1771, Smeaton and his contemporaries came together to form the Smeatonian Society of Engineers, which, therefore, according to the calculations of a noted English engineer, is five years older than the United States. The Institute of Civil Engineers of Great Britain came into existence in 1818 and was followed by its sister society, the Institution of Mechanical Engineers, in 1847. La Société des Ingénieurs Civils de France was founded in 1848. Die Verein Deutscher Ingenieure was organized in 1856. The Boston Society of Civil Engineers began its work in 1848.

Our elder sister national society, the American Society of Civil Engineers, was organized in 1852. The next member of the family, the American Institute of Mining Engineers, was born in 1871. Our own society came into existence in 1880, and our younger and very vigorous sister, the American Institute of Electrical Engineers, came along in 1884. Each of these four national societies—the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, has grown greatly since its organization, and each continues to thrive. During the process of upbuilding of these four great national societies several other national societies of specialists in engineering and many local societies of engineers have been formed, and all of these also are active and thriving.

Numbers Enrolled.

The four greater national societies have an aggregate membership at this time of over 19,000 members. Twelve national societies of engineering specialists contain more than 13,000 members. Twenty-three local engineering societies in different cities of the United States count over 8600 in their membership.

What does this great army of over 40,000 engineers, organized into many different societies, all for purely professional purposes, mean? It means that the engineering profession is making itself felt in this country of ours; that it purposes to take a prominent place in the great activities by which the country is being developed; that it will take its place in public affairs; that it is coming into its own. The national societies are not antagonistic to each other; on the contrary, they support and give confidence to each other. The national societies of specialists are not at war with the other national societies; they supplement them. The local societies are not in opposition to the national societies; they extend their influence; they are the outposts of the great army. The specialists do not interfere with each other. We are all specialists to a greater or less extent, but we are all engineers.

In the legal profession some men practice in the criminal courts; others devote themselves to titles in real estate; others are in corporation law; others practice in patent causes; they all squabble with each other in their practice, but when they meet in their bar associations they are all lawyers; they stand by each other and their profession; they are a power in the world. The medical profession is made up of surgeons, oculists, aurists, general practitioners, specialists of the skin, the heart, the lungs and every other part of the human anatomy; but when they come together in their general medical associations they are all doctors; they also stand by each other and their profession; they also are a power in the world.

In the engineering profession why may not the men who practice in steam engineering, in machine construction, in hydraulic, railroad, bridge, mine, electrical, metallurgical, refrigerating, heating, chemical and every other specialty in engineering come together, stand by each other and their profession, become known as engineers and be a power in the world?

International Joint Meetings.

When, in 1889, the Institution of Civil Engineers of Great Britain invited the four national American societies of civil, mining, mechanical and electrical engineers to visit it in London, there was inaugurated a spirit of friendship and co-operation in the engineering profession which has grown stronger and stronger as the years have passed. Following the visit in London, La Société des Ingénieurs Civils de France, in the same year, invited the American societies to Paris. Those who were fortunate enough to participate in those memorable demonstrations of hospitality cannot fail to realize how greatly the seed of co-operation sown in that year has fructified.

In 1900 this society was again invited by the Institution of Civil Engineers and the Institution of Mechanical Engineers to visit them in England, and again invited by the French society to visit it in Paris. Thus the spirit of co-operation was still further advanced by these remarkable meetings. On both occasions the sister societies abroad were untiring in the entertainment of the American engineers. The year 1904 was made memorable by the acceptance of an invitation extended by this society to the Institution of Mechanical Engineers of Great Britain to hold a joint meeting in Chicago. Thus the spirit of co-operation and good friendship was again strengthened and extended.

Now the Institution of Mechanical Engineers of Great Britain has expressed the desire to still further promote this friendly spirit by inviting this society to a joint meeting in July, 1910, in England. The council of the society has accepted this very cordial invitation of the Institution in the spirit of good-will in which it was extended. It remains now for the membership of the American Society of Mechanical Engineers to respond to this spirit and to go to England next year with its best talent and its best men.

Co-operation Between American Societies.

The helpful co-operation in professional work which has already been established with our sister societies over the seas is also becoming manifest in our own country. The four national societies of civil, mining, mechanical and electrical engineers on March 24, 1909, held in this auditorium a joint meeting on the "Conservation of the National Resources," which did much to bring engineers close together and into co-operative relation. Our society invited the Boston Society of Civil Engineers to join in the monthly meetings of the society recently held in Boston. The Engineers' Club of St. Louis in like manner was asked to join with us in the society's monthly

* Presidential address to the American Society of Mechanical Engineers, New York meeting, December 7, 1909.

meetings recently held in St. Louis. In all cases the invitations have been accepted in the best spirit of co-operation.

The engineering societies of the country may be likened to the members of a large and harmonious family, each member independent to do its own special work in its own way, each member ready to help each of the others, each residing in its own home, but all ever ready to stand by each other, to work for the common good, to advance and dignify the profession of engineering.

A striking example of the "getting together" of the engineering societies is found in this building, which is the home of our society. It is also the home of our sister societies, the American Institute of Mining Engineers and the American Institute of Electrical Engineers. Under the same roof are grouped together 15 other societies of engineering and allied arts; 25,000 engineers practicing in all the specialties of engineering may call this building their professional home. We are living together here in peace and harmony. We have brought our books together into a single library open to the profession and to the public, where every person is welcome. Our meetings are held in the same auditorium and lecture halls; the doors stand open that all who wish may enter. Our professional brethren of every society of every country are welcome here. The large hall at the entrance to the building is a foyer where all engineers may come together on the same plane; where they may unite to strengthen each other, to sustain and advance the profession of which they form a part.

The spirit of co-operation which now exists must be fostered, strengthened, made enduring, to the end that as great solidarity will exist in the engineering profession as exists in any of the other great learned professions.

Quality of Membership Important.

Numbers in membership are, of course, important in the societies which represent the engineering profession, but a high standard of membership is of much greater importance. With a considerable number of high grade technical schools throughout the country all striving with each other to raise the standards of engineering education ever higher and higher; and with the graduates from these institutions taking, from year to year, a larger and more responsible part in the great activities of the country, there is no lack of high grade material from which to form a membership in the engineering societies which will be worthy of the profession.

In the Institution of Civil Engineers, as well as in the Institution of Mechanical Engineers, of Great Britain, we are informed, no person is admitted into the lower grade of membership except he can pass a satisfactory examination as to the fundamental principles of engineering, by an Examining Board of the Institution. The rules laid down by this Examining Board form the standard by which the applicants to membership are measured. If the technical schools in Great Britain maintain an equally high standard in granting their degrees in engineering, then the degree may be accepted in lieu of an examination.

In other words, the engineering institutions in Great Britain establish the standard for the degrees granted by the technical schools. A promotion from a lower to a higher grade of membership is only made upon a showing of sufficient experience in engineering to satisfy the rules laid down by the Institution.

In the American Society of Mechanical Engineers, a person may enter the society as a junior upon the presentation of a degree in engineering from a technical school. But this society has not, up to the present, established a standard by which to measure that degree. I believe the standard for such a degree in engineering should be established by the society, and that it should be as high as that of the best schools of engineering in this country. It will follow that the schools having a lower standard will soon be brought up to the higher standard.

Promotion to higher grades of membership in our society is only made upon a showing of engineering experience satisfactory to our Membership Committee. This committee is maintaining a high standard of membership, and I believe that acting under the influence of the membership and the Council of the Society, it will not allow that standard to fall, but rather cause it to rise.

Broad Education Desirable.

If we are to have a profession of engineering, as distinguished from the trade of engineer, we must have a broad education befitting men of a learned profession, as distinguished from a narrower education sufficient for men of a trade. President Lowell of Harvard in his recent remarkable inaugural address, gave this as his conclusion: "The best type of liberal education in our complex modern world aims at producing men who know a little of everything and some thing well." If that conclusion be true of a liberal education leading to the learned profession of the law or medicine or theology, why is it not also true of a scientific education leading to the learned profession of engineering?

If preponderance be given to one part of President Lowell's conclusion over the other part, certainly knowing "a little of everything" leads to superficiality; while just as surely knowing but one thing well leads to narrowness. There would seem to be a happy mean between these two extremes in the education of the engineer.

The engineer capable of being at the head of the larger engineering works must know something of many things, several things well and one thing profoundly. The engineer president of a great railway system, for example, must know something of the alignment and gradients of the permanent way, its construction and maintenance; something of the proper location of sidings and stations; something of the system of signals, of the various kinds of cars, of the quality of water for the locomotives, of the heating and lighting of cars, and many other things.

He must know well that the bridges have been designed for safety and endurance and that they have been properly constructed. He must know well that the tunnels are safely protected against external pressure and falling rocks. He must know well that the locomotives for drawing the high speed trains, as well as those for the heavy freight trains, are of the very best design and capable of performing their duty with efficiency, economy and endurance. He must know well how to manage the traffic and keep the accounts.

He must know profoundly how to co-ordinate all the different parts of this complex organization so that each part will perform its proper and full function, to the end that passengers and freight will be carried safely, surely, quickly and cheaply, and also that dividends will be paid to the shareholders.

The engineer knowing something of many things, several things well and one thing profoundly, is still one sided if all this knowledge is confined strictly to his profession. He will be a much broader man, and a better engineer, if in his leisure hours he can turn his thoughts entirely away from his professional work and toward those things in nature and art which give that rest and renewal of the professional mind necessary to continued work.

Engineers have known for many years that the profession of engineering is a learned profession; the rest of the world is rapidly arriving at the same conclusion. When in April, 1907, this building was dedicated "To the advancement of engineering arts and sciences," President Hadley of Yale, where the learned professions have been taught for nearly 200 years, said:

> The men who did more than anything else to make the nineteenth century different from the other centuries that went before it, were its engineers.
>
> Down to the close of the eighteenth century the thinking of the country was dominated by its theologians, its jurists and its physicians.
>
> These were by tradition the learned professions; the callings in which profound thought was needed; the occupations where successful men were venerated for their brains.
>
> It was reserved for the nineteenth century to recognize the dominance of abstract thought in a new field—the field of constructive effort—and to reward the trained scientific expert for what he had done in these lines.
>
> Engineering, which a hundred years ago was but a subordinate branch of the military art, has become in the years which have since elapsed a dominant factor in the intelligent practice of every art where power is to be applied with economy and intelligence

It is encouraging to engineers to have their profession recognized as a "learned profession" by so great an authority as the president of Yale University.

Qualifications for Success.

Enthusiasm and devotion to his profession are characteristic of the engineer, and from my observation these begin with the student in engineering and extend right through his life. President Wilson of Princeton, in an address at Harvard not long since, dwelt upon "the chasm that has opened between college studies and college life. The instructors believe that the object of the college is study, many students fancy that it is mainly enjoyment, and the confusion of aims breeds irretrievable waste of opportunity." These conditions, I believe, exist to a much smaller extent in the technical schools, where engineers are taught, than in the general colleges, where a liberal education is obtained.

Enthusiastic love of work for his profession's sake resides in the heart of the engineer who becomes great. The man who merely works for wages and without enthusiasm does not rise; he remains a paid servant, and poorly paid at that.

Where enthusiasm exists love of work exists; success follows. Our individual enthusiasm is quickened by the study of the work of our brother engineers. What engineer while being whisked through the tunnels which connect Manhattan Island with the lands surrounding it can fail to rejoice in his profession as he contemplates the work of the civil engineers, the mining engineers, the mechanical engineers, the electrical engineers, which joined together supplement each other to produce success in those marvelous undertakings? The highest knowledge and skill in each of the four branches of the engineering profession were called for and were forthcoming in the consummation of this great work. It is not a question of which engineers did the most toward the success of this problem in transportation; they all did their best; they all did well; each contributed a necessary part to the success; they were all engineers working for the advancement of the profession of engineering.

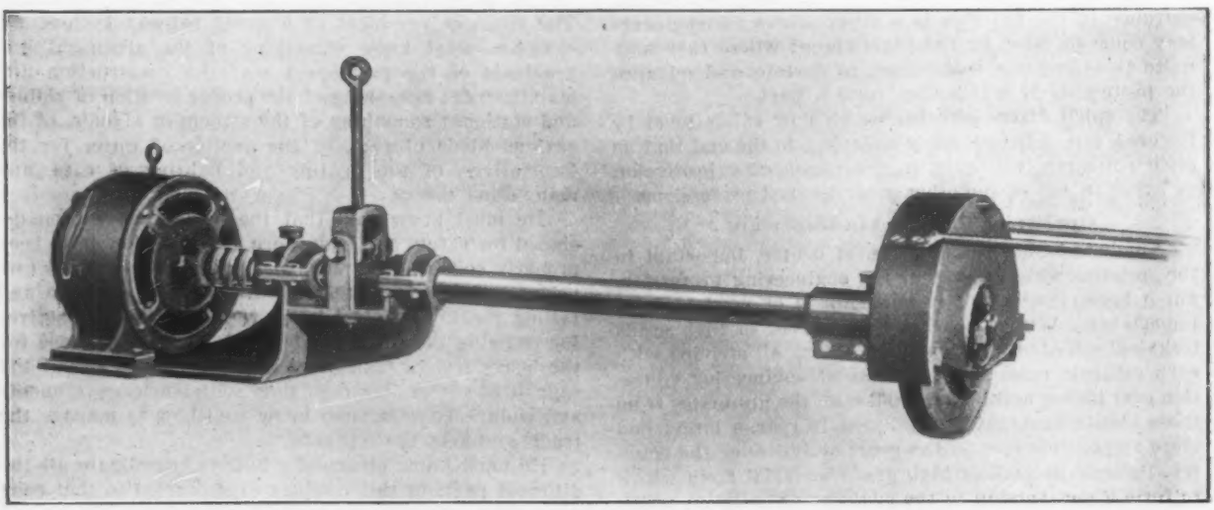
Will not every true engineer feel his enthusiasm in his profession quicken as he watches the great vessels of trade and the great vessels of war sweep out to sea, and he stops to consider how much of brains and long experience and hard work of many men are concentrated in each one of them? We marvel still, our enthusiasm is inspired, as we see ponderous steam locomotives and mysterious electric locomotives competing with each other in the hauling of trains, ever heavier and heavier, ever faster and faster, and both succeeding. The automobile in its present highly developed and thoroughly practical form is the result of enthusiastic work of many engineers principally within the last 15 years.

The enthusiasm of the engineer is never satisfied. Having conquered the highway with the automobile driven by the internal combustion gas engine, he now proposes to conquer the air with the aeroplane driven by the same kind of an engine in improved form.

The American Society of Mechanical Engineers has before it a future of usefulness to its members and influence in the profession which is unlimited. It only requires that we stand by our tradition of increasing the membership with men of high quality as engineers; that the members maintain enthusiastic devotion to good professional work; that they co-operate with each other in the broadest and most friendly spirit to produce that solidarity of membership and devotion to high ideals which will compel the world to class the profession of engineering with the other learned professions.

The Hassel Motor-Driven Emery Wheel Stand.

An entirely new idea in swinging emery wheel stands is the Hassel motor driven beltless emery wheel stand recently invented by G. A. Hassel, superintendent of the Pittsburgh Steel Foundry, Pittsburgh, Pa. A number of them are now in use in this foundry. It is stated that this grinder will do more than twice the work of any other device of its kind because of its convenience, elimination of belts, and the hard usage to which it can be subjected without fear of breakage, owing to the encased wheel. This device is designed to meet the demand for a grinder which may be freely suspended and swung around the point of suspension to grind a number of pieces of work without handling them.



The Hassel Suspended Motor Driven Emery Wheel, Made and Used by the Pittsburgh Steel Foundry, Pittsburgh, Pa.

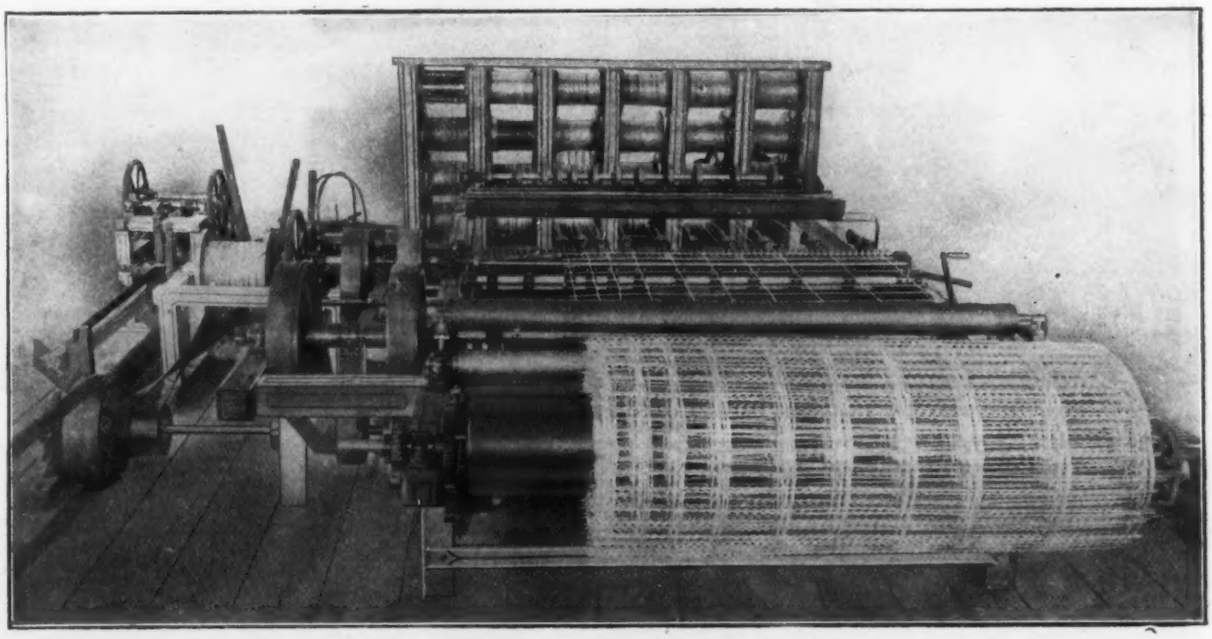
A specially designed dustproof 5-hp. electric motor drives an encased shaft of forged machinery steel, at the other end of which revolves a 24-in. emery wheel protected by a shield of heavy cast steel. The entire machine weighs about 1600 lb. and is suspended from a beam or roof truss by a chain, the lower end of which is fastened into the upright eye bar, so that it swings about 1 ft. above the floor. Two handles attached to the shield enable the operator to move the emery wheel back and forth at will for a radius of 8 ft.

The Illinois Steel Company is installing a coal testing plant at Joliet, Ill., for the purpose of testing the coking qualities of coal. This plant, it is understood, will cost $50,000 and will be in operation in January. It will wash and test samples of coal from the various mining districts of Illinois and Indiana, in comparison with the results obtained from coking coal from the recognized Eastern districts.

M. A. Hanna & Co., Cleveland, Ohio, have just opened a new sales office at 1516 Ford Building, Detroit, Mich., in charge of Oliver Phelps, resident manager, for the handling of the pig irons of this firm used north and west of the Ohio lines. These include the products of Zug, Cherry Valley, Dover, Fannie and Perry furnaces.

The Battle Creek Wire Fence Machine.

What is said to be the first practical power driven machine making a cable wire fabric with interwoven crimped wire or other pickets has been developed by the Battle Creek Wire Fence Company, Battle Creek, Mich. The machine is declared to be very simple in construction, to have few parts that can get out of repair, to be easy to operate and to require very little power. The builder believes the machine to have a great many points of superiority over the hand driven machines of various types that have been used to make a similar type of fabric. These include that it operates very much faster, can be easily and quickly adjusted to any size of mesh, or hight of fabric, or number of cables; that it takes up very little room, is not heavy, and, most of all, that it will handle a great variety of sizes of materials so that it will make a light fence or a heavy concrete reinforcement. It is expected that the machine will find an especially large field in the latter line, as it makes a fabric with a smooth rigid joint and uses a heavy crimped wire one way and a cable wire of two strands the other, to both of which concrete will adhere without likelihood of slipping. The machine also weaves a nice quality of ornamental fencing. The illustration herewith showing the machine was from a photograph taken at the last Michigan State Fair at Detroit.



A Machine for Making Woven Wire Fencing and Concrete Reinforcement, Built by the Battle Creek Wire Fence Company. Battle Creek, Mich.

The working parts of the fence making machine are mounted on a frame of 4-in. angle iron (the experimental machine had a wood frame, as shown), and are driven from a shaft running across the frame. Worms on the latter are used to drive the series of twisters through which the two wires that form the cable pass. Just in front of these is left a triangular opening in all of the cables, in the forming, through which the crimped cross wire pickets are fed by hand. While it would be perfectly feasible to use an automatic feed, this has not been done for the reason that it would require a man's attention to see that it worked perfectly and if it should miss it would make a bad place in the work. Moreover, a man can feed the cross wires as rapidly as an automatic device, and as it is such a simple process it did not seem to be advisable to employ automatic means. After each cross wire is introduced the machine twists the cables for another space or mesh. While the twisting process goes on the wires are drawn through the machine and the fabric is rolled up at the front around a drum operated by a system consisting of a rack, gears, spring and ratchet, so arranged as to take up what is passed along regardless of the size of the roll.

The main twisting worm shaft runs in opposite directions, thus reversing the twist between each cross wire. This is accomplished by the use of gear clutches directly connected to belt pulleys and manipulated by a lever at the operator's hand, by which the machine is thrown into gear after placing the cross wire, and then by means of an arm traveling on a second small worm shaft, adjustable trips are engaged which operate the clutches. When the clutches are thrown out the twisting stops at uniform distances, as determined by the trips. To insure an equal tension on all wires of the several cables they are passed singly around grooved wheels fastened to a common shaft at the rear of the machine. These wheels being all of equal size, form a perfect pay-out on the wires, as none of them will slip while the others are being pulled through.

The crimped wires are formed by running them through another machine, shown at the left in the engraving, which is entirely automatic. The wire is introduced to this machine and the crimping proceeds until a predetermined length has been crimped, when the crimping wheels are stopped by a traveling arm engaging a clutch transmission. The same operation which throws the clutch cuts off the wire and another traveling arm again engages the clutch, starting the crimping wheels once more. The length of the crimped wire is determined by adjusting the traveling arms, and the action is sufficiently exact so that there will not be over ¼ in. difference in the lengths.

Both of these machines and a spooler can be driven by a 2-hp. motor. The machine has been run on material having 16 cross stays to the rod at the rate of 1 rod per minute. While the machine illustrated is mounted on a wooden frame, those which will be constructed hereafter will be mounted on iron frames and will weigh about 3500 lb. and occupy a floor space of 12 x 18 ft.

Titaniferous Iron Ore to Be Utilized at Spokane.—A process perfected by E. H. Rothert for the manufacture of wrought iron and tool steel from titaniferous magnetic ore is to be used by a company named the Washington Steel & Iron Company, which has been incorporated under the laws of the State of Washington with an authorized capital of $1,000,000. A deposit with 3,000,000 tons of ore in sight on a tract of 270 acres in western Oregon has been leased by the company on a royalty basis. Mr. Rothert has been experimenting at Hoquiam, Wash., for several years and is said to have produced steel of high quality for saws, knife blades, razors and other edge tools. The new company will erect a plant in Spokane early in 1910. The head offices will be located in Spokane and the officers of the company are as follows: President, M. A. Corner; secretary and treasurer, O. P. Moore; general manager, E. H. Rothert.

The Clark Rapid Dumping Ore Car.

A new steel rapid dumping ore car which has given excellent results under test, has recently been built by the Clark Car Company, Pittsburgh, Pa. Fig. 1, gives a side view of the car, Fig. 2 views into the car, showing the doors closed and open, and Fig. 3 an end view, showing the operating mechanism. Its principal dimensions, which do not vary from those of other cars of its type, are given in the following table:

Length over striking castings, feet	22
Distance center to center of trucks, feet	13½
Truck wheel base, inches	64
Length of hopper, feet	18¼
Width inside hopper plates, feet	8½
Hight of car above rail, feet	9½
Capacity: Level full, cubic feet	672
Capacity: 30 degrees heap, cubic feet	820
Area of discharge door opening, square feet	47½

The car is of single discharge opening type, in which the draft stresses are carried to the side sills by suitable framing and the center sill is cut to make room for the hopper and door with the operating mechanism. The time required for dumping the load is so greatly reduced by this method of construction, that all the disadvantages that can be urged against cutting the center sill, appear to be more than offset, particularly since it has been shown that when correctly designed, cars of this type are fully as durable and satisfactory as those with a continuous center sill.

The doors are of the balanced type, which is a feature of most of the designs of this company. The size of the opening requires doors weighing about 800 lb. each, making 1600 lb. to be handled by the operator. With the ordinary type of door this would require worm gears, chains, ratchets or some such mechanism for their operation. With this type the center of gravity of the doors only moves about 1½ in. in a vertical direction, making it easy for a man to close the doors with one movement of a short length of gas pipe, which is used as a wrench.

The case of operation has made it possible to reduce the mechanism to very simple form, in fact, aside from the brake rigging, very little mechanism is noticeable.

Besides the hand dumping arrangements, the car is supplied with an air dumping equipment. This in no way interferes with the operation by hand, and it is entirely optional with the operator which is used, no special adjustments being necessary. The air cylinder is 9 in. in diameter with a 9 in. stroke. The car has recently been

Fig. 1.—The New Steel Rapid Dumping Ore Car Built by the Clark Car Company, Pittsburgh, Pa.

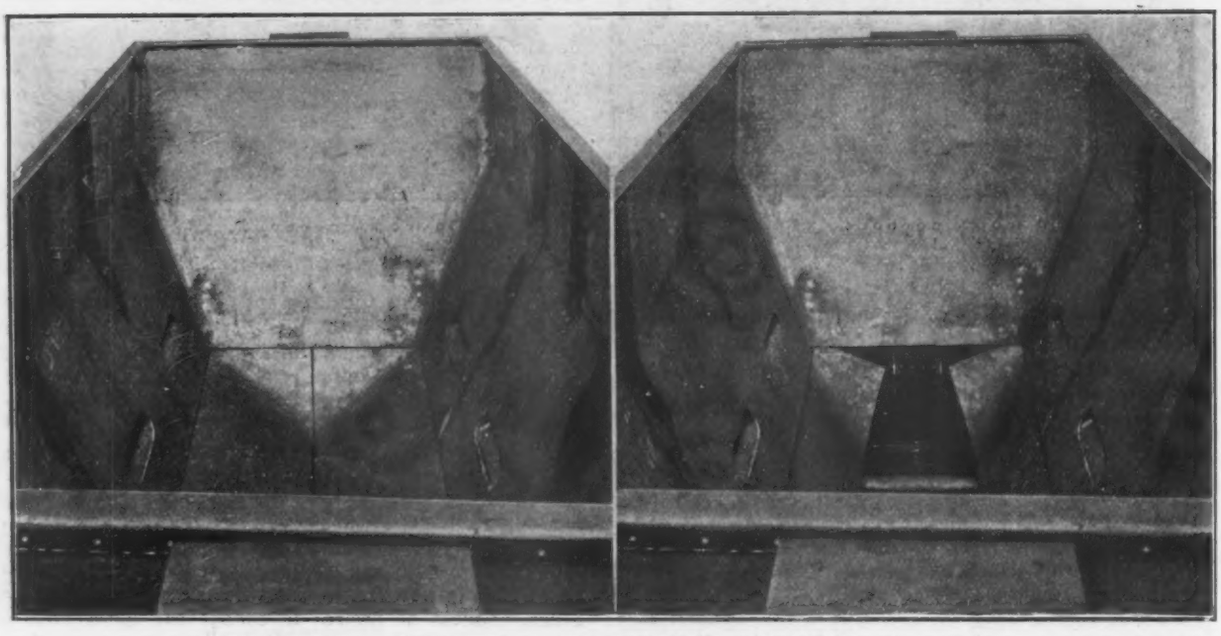


Fig. 2.—Views Into the Car, Showing the Doors Closed and Open.

equipped for purposes of experiment with a storage reservoir, with suitable valve and piping, and the doors have been operated as many as nine times while the car was cut off from the engine, without recharging the reservoir.

The tendency of long doors to sag at the center as a result of deflection under the load is overcome by placing the latch in the center of the doors, thus keeping the doors close together. The entire weight of the doors and the load on them is supported by wheels running on tracks at the ends of the doors, no load coming on the mechanism. This has permitted the mechanism to be made very light as compared with that usually seen on cars of this class.

The doors are so arranged that they are at all times clear of the wheels. It sometimes happens that careless dock hands allow empty cars to be sent off the docks with the doors either open or not securely latched, and this has resulted, with some designs of cars, in the wheels grinding against the doors, during the run back to the mines, thus injuring both wheels and doors. This is impossible with this car, as the doors would never touch the wheels.

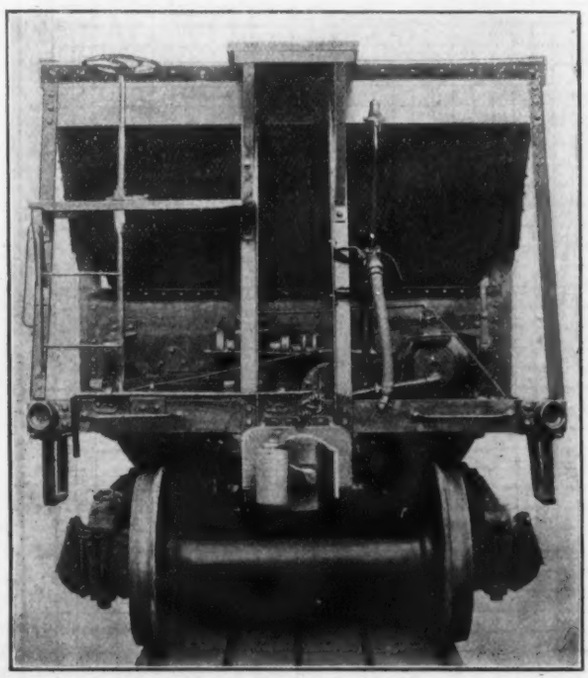


Fig. 3.—An End View of the Clark Ore Car, Showing the Door Operating Mechanism.

In operation, this car has proved very satisfactory; a record of 12 sec. has been made for the operation of opening the doors, dumping the load and closing the doors again by one man using the hand dump. Equally good records have been made with the air dump. It has been found that the unloading of this car requires less than one-thirtieth of the amount of labor that is required on cars of the ordinary type which must be bumped, hammered and poked to remove the load. These figures show that the labor force on the docks engaged in dumping cars could be reduced to one-tenth of the number now needed, and even with this reduced force, less than one-third of the time now used would be required for unloading a train of cars.

Another consideration in favor of this car is the personal safety of the laborers. With the type of cars now commonly used, a certain number of men are required to get up on the car to poke the load out of the car, with the result, as sometimes happens, of a man being caught by a sudden breaking of the mass of ore and carried down through the opening. As it is now at the docks along Lake Superior, men cannot be induced to work in the rain on account of the danger and discomfort. With cars of this type in use there would be no necessity for men to get into the car during the operation of dumping. Fewer men being needed, they could be carefully selected and provided with oilskins so that the work would not stop every time a shower comes up.

The cost of the car is substantially the same as that of other cars of its class. Summarized, the principal advantages of the car are: Structural strength, ease and economy of operation, speed in dumping the load, and economy of labor, without material increase in cost.

Franklin 1910 Motor Cars.

Sixteen models, including touring cars, close coupled cars, runabouts, limousines, a landaulet, a town car and a taxicab, constitute the line of automobiles for the 1910 season built by the H. H. Franklin Mfg. Company, Syracuse, N. Y. These are divided into three classes, according to the horsepower developed—namely, 42, 28 and 18.

The engine, air cooled like all its predecessors, shows a development that marks a great advance in the cooling system. The current of cooling air, instead of being forced directly upon the first cylinder and along the sides of the others in succession by a fan, is divided and applied in equal volume to the top of each cylinder, where it enters a sheet metal air jacket inclosing the cylinder and is drawn through by the exhausting action of a fan bladed flywheel at the rear of the engine base. The moving air completely envelopes each cylinder at all times and it is claimed that the suction is so powerful that the current is greater in volume and cooling power than any heretofore produced. These air jackets constitute funnel-like openings in a sheet metal deck over the engine base, and this deck with the pan beneath completely incloses the engine, compelling a positive air circulation.

The air is applied equally to each cylinder and to all part of the cylinder surface, producing a complete and uniform cooling. The cool air first strikes the hottest part of the cylinder—the head. In its course down the cylinder walls it travels along a series of vertical flanges which increases the heat radiating surface of the cylinder exterior. The air jackets not only direct and contain the air current, but insulate each cylinder, so that its heat is not communicated to an adjacent one.

Three features retained from previous models are an auxiliary exhaust, concentric intake and main exhaust valves, and a dome cylinder head, each of which is a considerable factor in the Franklin system of air cooling. The auxiliary exhaust at the base of the cylinder chamber opens immediately at the completion of the power stroke and carries off a large percentage of the hot dead gases, leaving only a relatively small amount to escape through the regular exhaust. The intake and main exhaust valves being concentric the use of a large charge is made possible. This arrangement allows a dome-shaped cylinder head, which is productive of a minimum of interior heat absorbing surface without reducing the heat radiating exterior.

As in previous models, the clutch is of the multiple disk type, the carburetor of the automatic float feed variety, and the ignition system single with a Bosch high tension magneto. There is no spark control lever as on all but the lowest powered cars the magneto is provided with a governor that controls the ignition up to a speed of 12 miles per hour on the high speed gear, retarding it automatically at that point to take care of the motor's needs. Unless he desires to change the speed ratio a driver has nothing to handle but the throttle in the control of his car.

Light weight and easy riding are emphasized as characteristics of the 1910 Franklins, as in those of past years, and they are maintained by a construction which includes a laminated wood chassis frame, full elliptic springs and large wheels and tires. The bodies are made largely of sheet aluminum. A wooden chassis frame, it is claimed, absorbs shocks more than a steel frame. In this absorption the frame is aided by the springs, the wheels and the tires. The use of large tires is also productive of long life.

The cars are finished in a variety of colors, each model having a distinctive scheme of colors and upholstering.

The Laramie-Poudre Reservoirs and Irrigation Project.

The following details regarding one of the most ambitious engineering enterprises now being undertaken in the West have been furnished by the Hampson-Fielding Engineering Company, Denver, Colo., which has the contract for the power plant, all equipment and the erection:

If one will take a map of Colorado, range 75 west, township 8 south, he will get the location of the east portal of a 12,000-ft. tunnel on the Cache la Poudre River, about 65 miles west from Fort Collins. The west portal is on the other side of the range, located on the Laramie River, at a point about 20 miles south from Gleneyre. The size of this tunnel will be 9 ft. wide by 7 ft. high, and it will be bored through a dense gray granite formation interspersed with quartz and feldspar.

The tunnel will have a single track of 30-lb. steel rails and will be worked from both ends. The compressed air equipment will consist of two Ingersoll-Rand Imperial type air compressors 17 and 10 x 14 in., belt driven, and each will have a capacity of 602 cu. ft. free air per minute. Two ¾-in. drills of the Leyner pattern will be used. One of these air compressors will be at the intake and the other at the portal end of the tunnel.

A rock filled log cribbed dam 100 ft. wide at the top, 90 ft. on the bottom and 10 ft. high, of the overflow type, is being built 9000 ft. above the east portal. This will be provided with a 30-in. sluice gate and a sluiceway for cleaning out the sand and gravel. From the dam will run 9000 ft. of 22-in. pipe (wood) to the main power house near the east portal. A trash rack 36 sq. ft. in area will be provided at the head gate. At the main power station there will be one 6-ft. Pelton water wheel with governor, for driving a 150-kw. General Electric dynamo. This dynamo will be used to transmit power to the intake portal a distance of 13,000 ft., and for furnishing light at the two headings and for other purposes. On the same pipe line there will be a 5-ft. Pelton water wheel with governor and extended shaft for driving a 13-ft. Connersville 32-oz. exhauster and the air compressor. The current will be transmitted at a voltage of 2300, stepping down to 110 volts for lighting and 440 volts for power.

At the intake portal there will be a similar Ingersoll-Rand air compressor, a 22-hp. electric hoist for operating the incline leading to the tunnel, a Connersville blower and an electrically operated pump. At each portal there will be suitable boarding and bunk houses and office buildings. It is estimated that the work will require about 22 months.

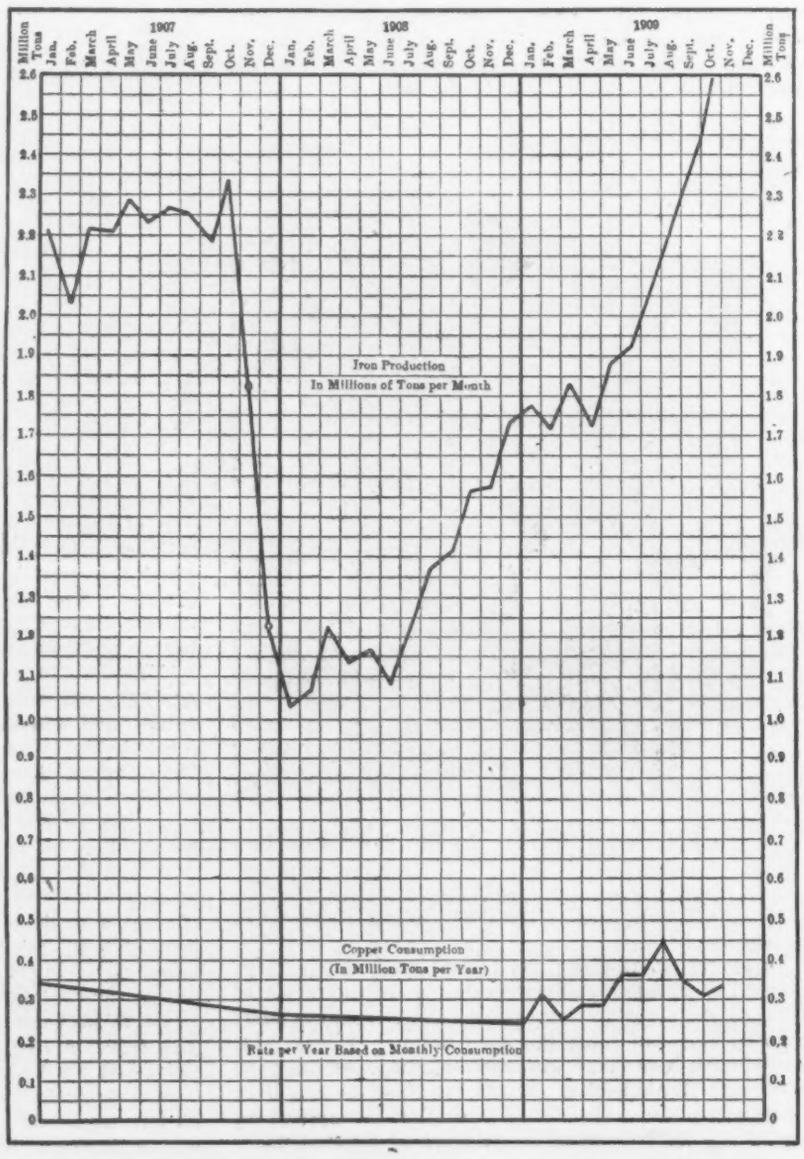
There is no truth in the report telegraphed from Birmingham, Ala., recently that the Bethlehem Steel Company had about closed negotiations for the Woodward Iron Company's properties. No thought of such an acquisition has been entertained.

The Pocahontas Fuel Company, 30 Pine street, New York, has appointed Watts, Watts & Co., Ltd., London, as foreign agents.

The Statistical Position and Future o Copper.*

BY JAMES DOUGLAS, LL.D.

In an article on the copper situation which appeared in the *Engineering Magazine* in October, 1907, I pointed out that there has been for the last 10 years an average consumption of 84 tons of iron to 1 ton of copper. If to the table then published be added the statistics of the production and consumption for 1907 and 1908, we can study the effect of the disproportionate production of the two metals during the period of depression. The enlarged table appears on pages 326 and 327.



Curves Showing Comparison Between Production of Coke and Anthracite Pig Iron and the Consumption of Copper in the United States, 1907, 1908 and 1909. The upper curve, showing pig iron production, is taken from *The Iron Age*, and shows millions of tons per month. The lower curve added shows copper consumption in millions of tons per year averaged on the monthly rate of consumption.

During 1905, when we were beginning to feel the stimulus of the boom, the production of pig iron in the United States rose rapidly from 16,500,000 to 23,000,000 tons; it remained stable during the two following years at between 25,000,000 and 26,000,000 tons, but responded to the reduced demand in 1907-1908 by falling to about 16,000,000 tons. This represented a percentage decline of 38 per cent. in one year. The production kept pace with consumption, as it was evidently not the policy of either the Steel Corporation or the independents to enter the markets of the world. [Doubtless the writer refers to "dumping" iron and steel on foreign markets.

* From the *Engineering Magazine* for December, 1909.

The Steel Corporation has been exporting on a considerable scale for some years.—EDITOR.] If the figures be correct, 1907 consumed a slight surplus left over from 1906. But production and consumption in 1908 almost exactly balanced.

During the same period, 1905, the production of copper was 390,000 tons, or an increase of only 7.04 per cent. over 1904; and yet in the face of a rising market the copper companies were able to produce in 1906 only 409,000 tons. During the closing months of the following year the Anaconda Company closed down and most of the sulphide companies reduced their production, bringing down the output from 409,000 tons in 1906 to 392,000 tons for 1907, or 17,000 tons under 1906. But, despite the continued trade depression, all the copper mines resumed active work in 1908, and the production in that year exceeded that of 1907 by 31,000 tons, though the domestfiic consumption of the United States declined 22,000 tons. This occurred in the face of a decline in the production of pig iron of 38 per cent., and of a similar decline in the domestic consumption of iron and steel, for we assume that all was consumed which was made.

Production and Consumption of Pig Iron and Pig Copper—1897-1908.

Year.	Pig iron produced in United States. Gross tons.	Per cent. of increase.	Pig iron consumed in United States. Gross tons.	Per ct. of increase.	Pig copper produced in United States. Gross tons.	Per ct. of increase.	Pig copper consumed in United States. Gross tons.	Per ct. of increase.	Gross tons pig iron consumed to 1 gross ton copper.
1897	9,652,680	11.94	9,381,914	13.36	221,958	6.32	122,500	20	77
1898	11,773,934	20.97	12,005,674	27.96	236,109	6.38	122,383	*0.10	98
1899	13,620,703	15.67	13,779,442	14.69	255,272	8.12	174,822	42.85	79
1900	13,789,242	1.23	13,177,409	*4.45	263,178	3.09	155,169	*11.24	85
1901	15,878,354	15.29	16,232,446	23.18	266,716	1.34	196,837	26.85	82
1902	17,821,307	12.23	18,436,870	13.58	284,284	6.59	209,241	6.30	88
1903	18,009,252	1.61	18,039,909	*2.15	316,239	11.24	221,222	5.73	82
1904	16,497,003	*8.39	16,679,555	*7.54	365,051	15.43	208,082	*5.94	80
1905	23,010,625	39.48	23,155,624	38.82	390,733	7.04	273,652	31.51	85
1906	25,307,191	9.98	25,603,202	1.06	409,652	4.84	298,472	9.07	89
1907	25,781,361	1.87	26,196,957	2.32	392,519	*4.18	240,098	*19.55	109
1908	15,936,018	*38.19	15,981,524	*38.99	423,302	7.84	218,087	*9.17	73
	207,077,670	6.98	208,670,526	6.82	3,825,013	6.17	2,440,565	8.03	85

* Decrease.

The balance was thus temporarily disturbed, and the disturbance became more marked during the first half of the present year, when the American production of iron was only 7,046,806 tons, and the domestic production of copper was admittedly largely in excess of that of 1908. This condition necessarily involved an accumulation of the red metal, which accounted for the growing surplus of copper stocks.

If we take the consumption of the world instead of the calculated consumption of the United States, and assume that the production of the world and the consumption of the world of both metals are equal, the results approximately correspond over a period of 10 years with the results deduced from American production and consumption, as shown by the following table:

World's Production of Pig Iron and Pig Copper.

	Pig iron produced. Gross tons.	Per cent. increase.	Pig copper produced. Gross tons.	Per cent. increase.	Tons pig iron produced to 1 ton pig copper.
1900	38,973,644	...	483,668	...	81
1901	40,303,525	3.41	521,140	7.74	77
1902	43,641,808	8.28	534,031	2.47	82
1903	46,369,165	6.25	620,624	16.21	75
1904	45,341,438	*2.21	682,284	9.93	66
1905	53,200,524	14.33	687,885	0.82	77
1906	58,141,267	9.29	704,182	2.37	83
1907	59,721,053	2.72	711,234	1.01	84
1908	47,508,692	*20.44	750,067	5.46	63
	433,201,116	2.70	5,695,115	5.75	76

* Decrease.

The average ratio agrees, but there are startling periodical variations. Through one of those periodical variations we are passing. If instead of a consumption in the United States of 84 tons of iron to 1 ton of copper only 78 tons of iron were consumed in 1908 to 1 ton of copper, while copper up to the full measure of 1 to 85 was being turned out, more copper was being made than there was a market for. The monthly statistics prove that to have been the case.

But during the third quarter of the present year the tide has turned and is running in the opposite direction. While the output of copper has continued large and the consumption slight, the demands on the iron and steel trade for actual consumption have become rapidly so great as to outstrip in great measure the efforts of the copper producers, both old and new, to keep pace with them. We have taken the liberty of adding to a diagram from *The Iron Age* of the coke and anthracite pig iron production for the United States in 1907, 1908 and 1909, a curve, representing the current of copper consumption in the country during the corresponding period.

Assuming that the average proportion of the iron production and the copper consumption is correct and that it will be maintained, if iron production and copper consumption should continue for any length of time to proceed at the present rate, the stock of copper on hand will rapidly disappear and the balance be restored. It may, however, take some time to adjust the disturbed equilibrium.

Koppers Coke Ovens for the Lake Superior Corporation.

After thoroughly investigating the different systems of by-product coke ovens, the Lake Superior Corporation placed a contract for the erection of by-product apparatus at Sault Ste. Marie, Ontario, Canada, with H. Koppers of Joliet, Ill., whose ovens and by-product plant were erected by the Illinois Steel Company at Joliet, and also adopted by the United States Steel Corporation for its works at Gary, Ind.

The plant at Sault Ste. Marie will consist of 110 ovens, arranged in two batteries, each of 55 ovens. The type of oven will be the same as is being erected at Gary, Ind., the size of each being 37 ft. between doors, 17 in. at pusher end, 21 in. at quenching end and 9 ft. 10⅜ in. at top of arch. The cost of the plant will be about $1,500,000.

The charge of coal for each oven will be about 13 tons, making a total charge for the 110 ovens of over 1400 tons of coal. The yield of coke per oven will be about 10¾ tons, or nearly 1200 tons per day. For the generation of industrial power nearly 10,000,000 cu. ft. of surplus gas will be available. Indicated by heat units, the quality of this gas is 500 B.t.u. per cubic foot, and represents a heat value of about 200 tons of good coking coal.

The Koppers improved method of recovering the by-products will be adopted at this plant. The distinguishing feature of this system is the extraction of ammonia direct from the gas in the form of sulphate of ammonia, without the employment of a water scrubbing process. An improvement in the coke quenching arrangement will also be instituted, so that instead of having a coke bench the coke will be pushed into a coke quenching car. It is expected that the plant will be in operation by January, 1911.

The Polar Flaming Arc Lamp.

As a particularly reliable and economical source of light Fox Brothers & Co., 126 Lafayette street, New York City, are offering the Polar flaming arc lamp in two types, one for operating on direct current circuits and the other on alternating current circuits. They are especially suitable for outdoor lighting, but are also adapted for lighting interiors of large areas, such as foundries, power houses, mills, &c. The fact that they do not emit obnoxious fumes removes the last objection that might be offered to their use inside of buildings.

The attractive appearance of the lamp is shown in the exterior view given in Fig. 1. The case is sheet steel, ordinarily finished in black, but also in different metal and color finishes when desired. The carbons are placed side by side, inclining toward one another at the lower ends, and are held in metal holders, which slide down guides under the influence of a feeding mechanism actuated by the resultant pull of a series and

Fig. 1.

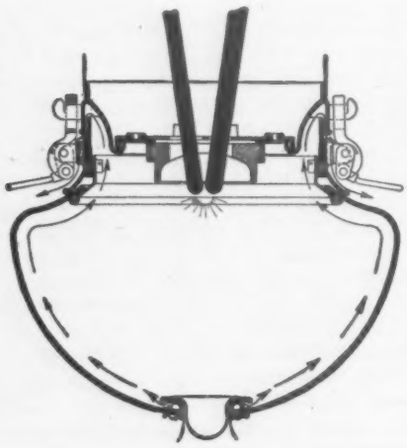


Fig. 2.

The Polar Flaming Arc Lamp and a Section Showing the Economizer and Ventilating System.

a shunt magnet working at right angles to each other. This is claimed to insure a sensitive and very accurate feed of the carbons, resulting in a steady burning arc.

The carbon ends converge at a point immediately below an economizer which, as shown in Fig. 2, is cup shaped and deeply recessed. It is made of highly refractory material. The arc itself burns in the economizer, which takes the place of an inner globe in an ordinary inclosed arc lamp. There is, therefore, only one globe used. The effect of the economizer is to concentrate the heat of the arc, producing thereby greater intensity of light, to prevent an excess of oxygen reaching the arc, which means longer life of the carbons, and to protect the arc from draft. This protection may be further supplemented by furnishing glass shields, which project below the economizer and increase the burning hours of the carbons by 10 per cent. These lamps equipped with 650 mm. carbons will burn for 20 hours before requiring retrimming. The deposit during the burning of the lamp, of pure white metallic oxide, on the inside of the economizer, makes it an excellent reflector, increasing the diffusion of light and reducing shadows.

The feeding mechanism is entirely separate from the main body of the lamp, and is contained in a separate weather and dust proof case provided with a rubber gasket and sealed. The main body of the lamp is below the feeding mechanism and is readily accessible for trimming by lowering the case by means of thumb hooks provided, as shown in Fig. 1. While trimming the case is suspended by chains attached to the lamp. Chains are also provided if desired for suspending the globe while cleaning it. The globe is secured by a strong, convenient and simple globe holder consisting of eccentric clamps which lock the globe and holder securely to the lamp.

A particular feature is the manner in which the common fault with flaming arc lamps has been overcome—*e. g.*, the accumulation of the products of combustion from the electrodes on the bottom and sides of the lamp globe, which, owing to the heat, become fastened to the glass so that they are difficult to remove. This deposit absorbs much of the light, reducing the useful illumination. In this lamp, by the system of ventilation adopted, the products of combustion pass off outside of the globe and are not deposited in it. The ash tray, as shown in Fig. 2, is designed so that the cold air from the outside passes through the openings provided and is constrained to pass around and sweep the inner surface of the globe instead of passing directly up through the center. This serves to keep the interior of the globe free from deposit.

The lamps are claimed to consume but 0.2 watt per candlepower and to give a light of upward of 3000 candlepower. The great candlepower at high efficiency is credited to the use of the impregnated carbons. The light comes mainly from the flame of the arc and very little from the carbon tip. The company is prepared to furnish carbons with cores impregnated with two different metallic salts, to give either a yellow or a white light. The yellow is stated to be the most agreeable, being similar to that of sunlight, and is always supplied, unless otherwise ordered, on account of its great penetration and candlepower and the fact that it is also the most efficient.

As these lamps require 46 volts at the arc they burn most economically when connected two in series on 110 to 120 volt circuits and four in series on 220 to 240 volt circuits. By using a resistance with the direct current lamp or an auto coil with the alternating current lamp either one may be burned singly on a 110 or 120 volt circuit. Two sizes of both types of lamp are made. The smaller take 400-mm. carbons and the larger 650-mm. carbons. The overall length of the smaller is 2 ft. 8 in. and of the larger 3 ft. 6 in., and the weights are respectively 26½ and 33 lb. for the direct current type and 25 and 32 lb. for the alternating current.

The Andrew Carnegie Research Scholarship.

The Iron and Steel Institute, 28 Victoria street, London, S. W., England, has issued the following announcement:

A research scholarship or scholarships of such value as may appear expedient to the council of the Iron and Steel Institute from time to time, founded by Andrew Carnegie (past president), who has presented to the institute $100,000 for the purpose, will be awarded annually, irrespective of sex or nationality, on the recommendation of the Council of the Institute. Candidates, who must be under 35 years of age, must apply on a special form before the end of February to G. C. Lloyd, secretary of the institute.

The object of this scheme of scholarships is not to facilitate ordinary collegiate studies, but to enable students who have passed through a college curriculum or have been trained in industrial establishments to conduct researches in the metallurgy of iron and steel and allied subjects, with the view of aiding its advance or its application to industry. There is no restriction as to the place of research which may be selected, whether university, technical school or works, provided it be properly equipped for the prosecution of metallurgical investigations.

The appointment to a scholarship shall be for one year, but the council may at its discretion renew the scholarship for a further period instead of proceeding to a new election. The results of the research shall be communicated to the Iron and Steel Institute in the form of a paper to be submitted to the annual general meeting of members, and if the council considers the paper to be of sufficient merit the Andrew Carnegie gold medal shall be awarded to its author. Should the paper in any year not be of sufficient merit the medal will not be awarded in that year.

Malleable Castings for Automobile Parts.

A leaflet recently published by Isaac G. Johnson & Co., Spuyten Duyvil, New York, discusses the "Danger of Malleable Iron for Automobile Parts." It gives the results of tests made by this firm, with comments upon them, as follows:

There is a growing tendency among some automobile manufacturers to use cheaper materials than formerly in their cars. This is natural enough in view of the keen competition in their selling departments. No one can take exception to the use of such materials provided they are good enough for the purpose designed, but economy should not be considered at the expense of safety. This, we claim, is the situation with regard to the use of malleable iron castings for certain automobile parts.

We have made malleable iron for more than 50 years and have in that time learned by experience the physical characteristics of metal of this class. With the greatest care there is in its production a lack of uniformity, and in its highest grade it is not homogeneous. A careful comparison of the fracture of this metal with that of first class steel will indicate clearly these conditions. It will be noted that the steel is uniform throughout. The difference in quality between the two metals is emphasized when a comparison of the physical properties is made. Our last test on high grade malleable iron, May 22, 1909, on three specimens gives the following results:

Test No. 1.

	Tensile strength per square inch. Pounds.	Elastic limit per square inch. Pounds.	Elongation in 2 in. Per cent.	Reduction of area Per cent.
First specimen	45,500	28,250	12.5	19.5
Second specimen	45,500	29,000	12.0	19.5
Third specimen	45,000	28,500	12.0	19.9

Now note a similar test on our cast steel made at the same time:

Test No. 2.

	Tensile strength per square inch. Pounds.	Elastic limit per square inch. Pounds.	Elongation in 2 in. Per cent.	Reduction of area. Per cent.
First specimen	75,125	37,375	37.0	53.6
Second specimen	75,000	37,500	31.0	52.5
Third specimen	75,000	37,500	32.0	52.0

The superiority of steel is obvious. There is, however, a more important difference still between the two metals. The Henry Souther Engineering Company of Hartford, Conn., well known as an expert in testing steel, has clearly demonstrated this by what is known as endurance of vibration test. Bars of the metal to be tested are revolved horizontally at high speed. Weights varying from 30 to 110 lb., according to the character of the metal, are suspended from the ends of the bars. The weights cause a slight bend or deflection in the bar. The amount of deflection is usually about .07 in. When the bar is revolved under these conditions it is clear that it is bent backward and forward as one bends a bit of wire when trying to break it. The number of revolutions the bar will stand before breaking shows its endurance or vibration quality. This is just the test that automobile castings are subject to in service. There is constant and severe vibration due to the unevenness of road, action of engine and explosions in the cylinders. Note the comparative value of malleable iron with steel under this condition. The bars selected for the tests Nos. 3 and 4 were, as in tests Nos. 1 and 2, of the best grade.

Test No. 3.—Vibration Test on Three Cast Malleable Iron Specimens.

	Weight on ends of bar. Pounds.	Deflection. Inches.	Revolutions. 1st end.	Revolutions. 2d end.
			Broke.	Broke.
First specimen	80	0.07	97,300	97,100
Second specimen	80	0.07	1,700	2,000
Third specimen	80	0.07	86,700	87,800

The important fact is here brought out that cast malleable iron is not at all uniform in endurance test. While one specimen withstands 97,300 rev. before breaking, the next one breaks after 2000 rev. This is what should be expected of a metal that is not homogeneous. Compare the same test on cast steel:

Test No. 4.—Cast Steel Specimens.

	Weight on ends of bar. Pounds.	Deflection. Inches.	Revolutions. 1st end.	Revolutions. 2d end.
			Unbroken.	Unbroken.
First specimen	80	0.05	30,934,000	30,934,000
Second specimen	80	0.05	30,740,700	30,740,700
Third specimen	80	0.05	32,183,700	32,183,700
Fourth specimen	80	0.05	30,000,000	30,000,000

Not only is there a very much higher endurance quality shown by the steel, 32,183,700 rev. as compared with 97,300, but what is of more value, the steel is uniform in this respect. Even after this severe test the steel bars were not broken. It seemed unnecessary to carry the test further because the great superiority of steel was already clearly demonstrated. Steel of this quality therefore can be depended on, while in the case of malleable iron both the builder's reputation and the safety of the passenger are endangered by its use. By using a suitable factor of safety cast steel can be employed without risk, whereas malleable iron may endure for a reasonable time and yet again it may break after giving but a short service.

If it is objected that all of the above is largely theoretical and that the case against malleable iron is not clearly proven, we might add that a fact was recently called to our attention which certainly cannot be classed as theoretical. A hub casting on one of our automobiles was found to be broken through the center. The car had been in ordinary service about a year. It was made by one of the prominent manufacturers of our country; had given excellent service and was thought to be entirely satisfactory until the chauffeur noticed that one of the wheels was "wabbling." Examination showed the broken hub. We gave it a careful inspection and found it to be made of first class cast malleable iron. In finishing a hub casting it is necessary to remove a portion of the exterior metal. This exterior metal is the best part of a malleable iron casting, as can be clearly seen by examining the fracture of good malleable iron. When, therefore, you remove the best of a metal that at best is none too good, it is clear to any one that the finished casting is, to put it mildly, an uncertain quantity. If the hub had been made of a good grade of cast steel, a metal which is homogenous and uniform, we do not hesitate to say that such a break would have been impossible.

In view of the above facts we claim that malleable iron is not a reliable metal for automobile parts.

A Portable Railroad Machine Shop.—Through a happy thought of a section boss on one of the western divisions of the Panhandle Railroad, a branch of the Pennsylvania Company, a motor car has been converted into a moving machine shop. An attachment devised by him has been made, whereby a grindstone, emery wheel, rip saw and other similar tools may be operated at a speed almost commensurate with that in use in the machine shops. The car is blocked up at one end with the power wheels off the ground and a belt is placed on the wheels connected with the engine on the car. It is geared up to permit of a high speed and much of the work which formerly forced the section gang to make a long journey to the shops is now done at some point along the road. Nearly all the hand cars at Logansport, Ind., a division headquarters of the company, have been equipped with the device, and maintenance-of-way officials who have seen its operation predict its general use within a few years.

The construction of the Pennsylvania Railroad tunnels from Bergen Hill, N. J., to Long Island City, N. Y., was practically completed December 3, when the final section of concrete was placed in tube D, the fourth and last of the tunnels under the East River to Sunnyside Yard in Long Island City. The only construction work remaining to be done consists of some minor features of the Long Island City shafts. These will be soon completed. With all of the construction work on the tunnels finished, it will be possible to go ahead rapidly with the electrification, signal installation, lighting and track laying.

THE IRON AGE

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Pig Iron Supply and Demand.

The pig iron situation is of peculiar interest at a time like the present, when the industry is closely approaching a balance between production and consumption. In respect to other than steel making irons the question is being asked by close students of the situation, whether production may not now be fully up to the current requirements of melters. Full statistics of stocks of pig iron at furnaces would be valuable, even though their interpretation would depend somewhat on the amount of iron carried by consumers. This last item is presumably larger now than at any time in more than two years, since in an advancing market iron bought in the early stages of the rise is taken forward as deliveries mature, without regard to the immediate needs of the buyer. Judging the status of furnace stocks generally by the showing made December 1 by those furnaces reporting stocks, there was little change in November, and in a good many cases the December figures showed a slight increase.

What will follow a halt in foundry iron buying, such as has been seen for nearly a month, depends in part on whether the foundries will soon be operating on a larger scale, and in part on the chances of further expansion in foundry pig iron production. As to the former, without going narrowly into an analysis of conditions in the various foundry lines, it is to be said that the season is not favorable to any marked increase in the demand for castings, apart from the work resulting from railroad equipment orders. Foundries dependent on agricultural demand will be busy soon after the turn of the year, and in other lines the spring demand will be anticipated to some extent, but jobbing and machinery foundries are not now and will not be for some time on a scale of operations approaching that of the first half of 1907.

On the other hand, the limit of probable production of foundry iron at the present level of prices is not far off. With the attraction of high prices for steel making iron, and a demand from steel companies beyond any expectation, the competition between foundry brands has not been felt in the way often seen when a revival of business comes after a period of depression. The statistics show that so far as the steel companies themselves are concerned their pig iron production since the middle of the year has been a greater percentage of the total than at any time in three years at least. The figures below emphasize not only the largely increased tonnage of pig iron produced by the steel companies in the past five months, but the important increase in percentage.

Production of Steel Making Pig Iron by Steel Companies.—Gross Tons.

	Total coke and anthracite pig iron	Steel companies' production.	Steel companies, per month.	Per ct. steel companies.
First half 1907.....	13,223,770	8,523,245	1,420,541	64.4
Second half 1907....	12,088,933	7,573,489	1,262,248	62.5
First half 1908.....	6,758,615	4,454,630	742,438	65.9
Second half 1908....	8,882,922	5,697,192	949,532	64.1
First half 1909.....	10,890,167	7,046,804	1,174,467	64.7
July-Nov., 1909.....	11,882,616	8,220,680	1,644,136	69.2

To the above production by steel companies is to be added the large amount of steel making iron (as indicated by the reported sales of the past three months) which merchant furnaces have been and are now producing. This demand for outside iron bids fair to continue well into 1910, as indicated by liberal purchases made for delivery in the first quarter.

The number of furnaces going out for repairs is a factor to be taken into account, as the number of producing furnaces increases. The Steel Corporation had 12 idle furnaces (counting only those fit for operation) on December 1, and the independent steel companies had 8. With all the strain to increase production, the corporation had practically a constant number of active furnaces (100) for three months and the independent companies a constant number (57) for four months. Among merchant furnaces, reckoning those in shape to produce iron, the number of idle ones that can make iron profitably at the present level is comparatively small, disregarding those out of blast for relining and repairs. Speaking roundly, the pig iron industry, after a rapid increase in output over a period of seven months in the effort to overtake consumption, now finds supply and demand fairly in equilibrium.

The Uncovered Concrete Floor.

The uncovered concrete floor for a shop in which machinery is installed has found its critics. The head of a large concern, in making careful investigations preliminary to building new works, learned from those having had experience with this type of flooring that two reasons for dissatisfaction have developed. A certain amount of insidiously fine dust, composed of particles hard enough to act as an abrasive, gets into the air and eventually into bearings, causing serious wear. The other reason is that the stone-like surface affects the feet of workmen who have to stand during their work, causing various ailments, among them the tendency to break down the arch over the instep. It is a well established fact that protracted standing, as distinguished from walking, may have serious results, and this may be accentuated by conditions more unfavorable than others. Possibly the difference in temperature of the concrete as compared with wood may have something to do with this, or there may be a degree of dampness. However that may be, workmen complain of concrete floors and it is noticeable that in rooms which have them the men are frequently seen to stand on boards which they provide for themselves.

Probably the most satisfactory floor is one consisting of concrete with boards set in it. In one shop where this matter was given a great deal of thought, the floors have as a base slabs of concrete, upon which is a layer of hemlock plank, set in a special preparation, and on top of this an unspiked course of diagonal flooring, with square edge maple floor as the surface. This system has the advantage of alleviating the objections referred to,

and at the same time permits of fastening down machinery. Certain classes of machines, especially such manufacturing tools as presses and headers of the smaller sizes, require rigid installation because the shock of rapid blows causes vibration out of proportion to the mass. A substantial thickness of wood affords an easier means of accomplishing this than the bare concrete.

Growing Interest in Waterways.

A remarkable awakening of public interest in the question of waterway development has recently occurred. The business men of the country are taking hold of the subject, and there is every prospect that at some time in the near future Congress will adopt a comprehensive plan that will provide the country with a national system of water transportation. The most important projects that are under consideration would afford cheaper and larger facilities for assembling the raw materials of industries, and this makes the subject one of peculiar interest to manufacturers.

The large expenditure which the National Government made in developing the Sault canal and locks is an illustration of the benefits that may accrue to the entire nation. It has increased the production of iron and steel by providing cheaper transportation from the Lake Superior District, and this has added enormously to the wealth of the whole country, for the iron of the Lake Superior mines has been distributed through every section to the most remote parts of the country in the form of steel rails, machinery, structural material, hardware and other additions to the permanent wealth of the people. It has afforded cheap transportation for grain and flour from the Northwest and merchandise from the East to the Northwest, and it would be difficult to estimate how much the country has gained from this one improvement.

The Erie Canal, built by the State of New York, and maintained by the State, furnished cheap transportation from the seaboard to the great West before a trunk line railroad was possible, and after the railroads were built it made the pace for them and encouraged them to develop economy in long hauls of carload freight. One State in this great undertaking invested money for the benefit of the whole nation, and the local benefits to the people of New York are so clearly apparent that the State is now engaged in spending an additional $100,000,000 for a more efficient barge canal.

In the Mississippi Valley nature has provided one of the greatest waterway systems in the world, but man has failed to utilize this natural resource, and the chief difficulty in the way has been the mistaken idea that a waterway improvement is a local affair, or valuable only to people who make immediate use of it. The Mississippi River has not been utilized as it should be because local improvements that are needed have not been provided. A railroad that begins nowhere and ends nowhere carries but little traffic and is a failure as an investment, and our waterways outside of the Great Lakes have been under this disadvantage in that they have lacked the connecting links that would unite them into one great system. The connecting link between the Chicago Drainage Canal and the Illinois River, which would unite the Great Lakes and the Mississippi River, has received but little attention because it has been looked upon as a local improvement for the benefit of Chicago. From Cairo to the gulf there is a good stage of water all the year, but between Cairo and St. Louis improvements are needed, as under present conditions the river can only be used in the spring and fall. The projected improvement of the Ohio River would afford a 9-ft. stage of water from Pittsburgh to Cairo and will be of great importance to Pittsburgh and the cities on the river, but it will be vastly more valuable as a national asset if carried out in connection with a general system for improving all our interior waterways.

The difficulty has been chiefly in the attitude of the individual Congressman. His interest is centered in carrying elections in his district, and everything else is of secondary importance. When an appropriation is pending for waterways, public buildings or other improvements, he has been strenuous in getting some of it for his district, regardless of whether it would promote the welfare of the whole people. Under this legislative system our waterway appropriations have been made with a view to carrying elections rather than carrying or promoting the commerce of the nation. Money has been wasted on creeks and small rivers and other local projects which have been of no benefit to the country so long as they are isolated. It has been impossible to make any progress with the great connecting links of a national waterway system because the allotments from the pork barrel to the Congressional districts in which these connecting links are located have been exhausted in preliminary surveys and estimates, leaving nothing for the actual work of construction.

The interest awakened in this subject may bear fruit by concentrating the attention of the people on the connecting links which should be provided first of all. Business men who discuss the question or take part in promoting public sentiment may find it to their advantage if they will direct their attention to the fact that a connecting link of a national system of waterways is, in fact, a national asset, and that the interests of the nation should not be subordinated to the question of carrying local Congressional elections. When the short disconnected lines which were afterward joined into the New York Central were local railroads and it was necessary to transfer freight and passengers by teams from one road to the next, through traffic of any importance was impossible. A broken system of waterways is of little value to commerce for the same reason. What is needed is a system that can be used to carry raw materials a long distance at the low cost at which such freight can be handled in barges. Railroad traffic is becoming so congested on the main trunk lines that in many cases the cost of hauling is increasing on account of train interference. The railroads until recently were opposed to waterway development, but their leading officials now see that if they can be relieved of some of the tonnage of raw material and other commodity freight which must be carried at very low rates they can make a larger profit from the development of high class freight or passenger business.

Europe has a great advantage over America in respect to transportation for manufacturing industries. The long, deeply indented coast line of Europe and the network of navigable rivers bring all the industries and great resources in raw material within easy reach of tidewater, while in the United States our great national resources and many of our exporting industries lie inland. If we are to compete with Europe in the world's markets we must utilize every natural resource that will reduce our cost of assembling materials and getting the product to the seaboard. This objective should be kept in mind by all business men who are devoting their attention to this great question.

The Motor Car Paying Its Debt to Machine Tools.

The machinery builder has begun to draw upon the automobile designer for essential features of his product. The time was, only a few years ago, when the manufacturers of motor cars were almost wholly dependent upon the practice which had been developed by the men who had brought metal working machinery, especially machine tools proper, to a splendid efficiency. Much the greater part of the early success of the new industry was built upon this experience. The bicycle was of some assistance, but when it came to the application of high powers, involving reliable generation and transmission, the engineers turned to the precision practice of machine design.

To-day the automobile is making its first payment of its debt. Its wonderful progress, following the united concentration of many able engineering minds, has established the application of principles in a new way, and some of them have been accepted by the machinery builders. Inserted bushings have been embodied in the place of ball bearings in a new high-speed sensitive drill. The off-set crankshaft has replaced a much more complicated and expensive mechanism for the quick return of a heavy machine built by a house of very high standing. New designs of clutches have been applied most successfully. Other instances could be found, no doubt, to prove the statement. It was inevitable that this should be the case. Where a great demand arises for any new product, the consequence must be developments and discoveries which are adaptable to older products, the new influence extending far beyond the field which it was primarily aimed to cover. Machinery designers might do well to give still greater attention to the study of this latest source of ideas.

The Newark Foundrymen's Association.

The Newark Foundrymen's Association, at a meeting held on the evening of December 1, at Achtel-Stetters' Dining Hall, Newark, N. J., listened to an address on "Foundry Costs," by C. E. Knoeppel of Pittsburgh, who is connected with the Emerson Company. The paper was discussed by J. F. Bernhard of the Thatcher Furnace Company, Arthur E. Barlow of the Barlow Foundry Company and others. During the discussion one member called attention to the fact that in handling small job business it is a very difficult thing to arrive at the cost of each job because molders are liable to be inaccurate in their records as to the time spent on each job. "We find it," said he, "a vexed question to get at the cost, and often it is more expensive to us for the foundryman to give up his regular work and take the time to fill out cards." It was suggested that the work of recording costs might be done by cheaper help and to better effect than if left to the molder.

The Charles G. Smith Company, 603-604 Park Building, Pittsburgh, dealer in machine tools, machine shop and emery grinding equipments, states that reports are being circulated broadcast that it proposes to retire from the machine tool business, owing to its affiliation with the Pittsburgh Emery Wheel Company. These reports are not only false, but have done considerable damage to the company, which does not intend to retire from the machine tool business, but, on the contrary, will push this trade more actively than heretofore. It hopes to enjoy a share of the machine tool trade in the Pittsburgh territory in the future as it has in the past.

The Dunbar Furnace Company, Dunbar, Pa., has recently started mining and using some native ores found near its furnace, and is mixing these with lake ores, which gives a suitable mixture when the furnace is running on foundry iron.

October Exports and Imports of Iron and Steel.

According to the October report of the Bureau of Statistics of the Department of Commerce and Labor, a gain was made in exports and a slight loss is shown in imports of iron and steel in that month as compared with September. The value of the total exports of iron and steel and manufactures thereof, not including ore, was $14,249,598, against $12,966,908 in September. The total value of the same class of imports was $2,636,195, against $2,703,829 in September. The exports of commodities for which quantities are given totaled 111,802 gross tons in October, against 97,393 tons in September, 105,695 tons in August, 100,681 tons in July, 114,751 tons in June, 109,977 tons in May, 100,904 tons in April, 94,523 tons in March, 84,860 tons in February, and 70,085 tons in January. The details of the exports of these commodities for October and for the 10 months ending with October are as follows:

Exports of Iron and Steel.

	October.		Ten months.	
	1909.	1908.	1909.	1908.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron	7,908	6,521	48,575	37,089
Scrap	650	2,892	24,137	19,983
Bar iron	1,982	661	12,659	6,352
Wire rods	3,747	1,199	14,418	5,662
Steel bars	8,588	3,711	59,469	36,272
Billets, blooms, &c	3,928	8,537	98,522	94,852
Hoop, band, &c	377	215	2,671	3,672
Steel rails	22,036	19,364	211,820	175,462
Iron sheets and plates	7,308	4,180	58,259	36,309
Steel sheets and plates	9,229	5,156	83,099	48,749
Tin and terne plates	631	72	7,456	11,478
Structural iron and steel	6,040	9,079	74,473	100,527
Barb wire*	9,357	7,099	58,505	†20,231
Wire*	5,298	4,494	65,344	90,819
Cut nails	919	415	7,800	5,904
Wire nails	3,550	1,276	24,675	21,122
All other nails, including tacks	416	669	6,253	4,205
Pipes and fittings	19,838	10,226	132,347	96,188
Totals	111,802	85,766	990,482	814,871

* Not separately stated prior to July 1, 1908.
† Figures are for July to October, inclusive.

The imports of commodities for which quantities are given reached a total of 34,230 gross tons in October, against 32,166 tons in September, 22,121 tons in August, 29,136 tons in July, 19,402 tons in June, 18,352 tons in May, 17,772 tons in April, 20,714 tons in March, 19,418 tons in February, and 19,782 tons in January. The details of imports of this class of products for October and for the 10 months ending with October are as follows:

Imports of Iron and Steel.

	October.		Ten months.	
	1909.	1908.	1909.	1908.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron	11,851	8,103	111,674	73,383
Scrap	11,259	82	25,522	3,748
Bar iron	2,307	766	13,968	15,800
Rails	203	197	742	1,321
Billets, bars and steel in forms n.e.s.	1,517	568	13,370	7,762
Sheets and plates	400	191	306	1,976
Tin and terne plates	4,963	1,656	4,936	51,367
Wire rods	967	933	9,514	9,503
Structural iron and steel	763	515	5,327	2,295
Totals	34,230	13,011	185,359	167,155

The imports of iron ore in October were 179,505 gross tons, against 164,613 tons in September, 209,855 tons in August, 172,316 tons in July, 124,714 tons in June, 97,393 tons in May, 74,782 tons in April, 108,676 tons in March, 61,749 tons in February and 105,233 tons in January. Of the October imports 89,533 tons came from Cuba, 59,800 tons from Europe, 23,957 tons from British North America and 6215 tons from other countries. The total imports of iron ore for the 10 months ending with October were 1,298,836 tons, against 560,824 tons in the corresponding period of last year, and 1,055,701 tons in the same months of 1907.

The total value of all the exports of iron and steel and manufactures thereof, not including ore, in the 10 months ending with October, was $128,170,458, against $127,985,824 in the corresponding period of last year. Similar imports in the 10 months ending with October were, respectively, $23,516,177 and $16,389,753.

PERSONAL.

Edward Blake, Jr., who has been made a director of the Wells Bros. Company, Greenfield, Mass., is also the manager of sales, with which department he was connected under Franklin E. Snow, the retiring president of the company. Mr. Blake has been identified with the business for seven years, during which time he has steadily advanced in the responsibilities intrusted to him.

J. Frank Dutcher has been elected president of the Draper Company, Hopedale, Mass., builder of textile machinery. He fills the vacancy caused by the death of Joseph B. Bancroft. Eben D. Bancroft takes Mr. Dutcher's place as vice-president.

J. K. Dimmick & Co., Land Title Building, Philadelphia, Pa., announce that on December 1 M. R. Gano was admitted as a member of the firm.

I. C. Kelly, for 10 years master mechanic of the T. & C. Frick Coke Company, Scottdale, Pa., has resigned to accept the position of general manager of the Connellsville Machine & Car Company, Connellsville, Pa., succeeding F. H. Eaton, resigned.

The Pocahontas Fuel Company, 30 Pine street, New York, has appointed James T. McDonald as manager of its Boston branch. He has taken offices in the Board of Trade Building, corner of Broad and State streets, Boston, Mass.

George L. Crook has entered the employ of the M. Rumely Company, La Porte, Ind., as works manager. The claim is made that he has superintended the building of more gas engines than any other man. He was formerly general superintendent of the Fairbanks-Morse Company, Beloit, Wis.; later of the International Harvester Company, as general manager of its gas engine plant at Milwaukee, and has just completed a most efficient manufacturing organization in the E. M. F. automobile plant at Detroit, Mich.

Dr. H. Fuchs of the H. Fuchs Waggonfabrik A. G., a large freight and passenger car manufacturer at Heidelberg, Germany, will leave December 11 for Germany, after an 11 months' visit among American manufacturing plants.

John Zane, Escanaba, Mich., has become manager of the Pingret Engine Company, Buffalo, N. Y., having disposed of his interest in the Northern Construction & Engineering Company.

Jeremiah Dwyer, the veteran stove manufacturer, chiefly known through his long identification with the Michigan Stove Company, Detroit, Mich., celebrated his golden wedding November 22. Six sons are prominently connected with metal working companies in Detroit, four of them with various stove works.

Albert P. Saxer, formerly with the Brown & Zortman Machinery Company, Pittsburgh, is now connected with the sales department of the Niles-Bement-Pond Company, Frick Building, Pittsburgh, Pa.

Joseph Leon Gobeille of the Gobeille-Harris Pattern Company, in an address at the third annual dinner of the Niagara Falls, N. Y., Board of Trade, advocated the establishment of an industrial correspondence school in connection with the Carnegie Library at Niagara Falls. He outlined the course which should be provided and the mechanical and industrial instruction which should be given to the wage earners of the city.

R. F. Randolph, formerly superintendent of the merchant mills of the Bethlehem Steel Company, has been appointed successor to S. B. Sheldon, whose resignation as general superintendent of the company's Saucon plant at South Bethlehem has already been noted. The statement previously made concerning Mr. Sheldon's successor was incorrect.

Frank H. Strong, who represents machinery supply and hardware houses in Manila, where he conducts a large export and import business, is visiting the trade in this country. He is making his headquarters at the offices of W. J. Kingsland, 24 State street, New York.

F. W. Horn, who represents the Niles-Bement-Pond Company and other American machinery manufacturers in Japan, is on a visit to this country and is making his headquarters at the offices of the Niles-Bement-Pond Company, 111 Broadway, New York.

A. G. Schonacker, 520 American Central Life Building, Indianapolis, Ind., is manager of the new branch office established there by the Patterson Tool & Supply Company, Dayton, Ohio.

Samuel Mather of Pickands, Mather & Co. and William G. Mather of the Cleveland-Cliffs Iron Company, Cleveland, Ohio, sailed last week for an extended trip through Europe. They expect to be gone about six months.

Frank Barry, formerly New York manager of the Chapman Valve Mfg. Company, Indian Orchard, Mass., has been transferred to Chicago where he will have charge of all the Western business for that company. A. M. Page succeeds Mr. Barry as local New York manager.

William Edenborn and Marvin Hughitt have been succeeded in the directorate of the United States Steel Corporation by Percival Roberts of Philadelphia and Samuel Mather of Cleveland. Both Mr. Hughitt and Mr. Edenborn have severed their connection with the corporation because of the pressure of their other interests. Percival Roberts was at one time president of the American Bridge Company and a member of the Steel Corporation's directorate. He is a director of the Pennsylvania Railroad Company. Samuel Mather is the head of the firm of Pickands, Mather & Co., Cleveland, and a director of the Lackawanna Steel Company.

S. L. Nicholson has been made general sales manager of the Westinghouse Electric & Mfg. Company, and will have direct charge of the sales policy of the entire company. He has been identified with the company for 11 years. Charles Robbins, who was connected with the industrial and power sales department of the company for some years, has been made manager of that department, with headquarters at East Pittsburgh, Pa. G. B. Griffin has been appointed manager of the detail and supply sales departments, and Samuel A. Chase, who has had charge of the New York sales department, has resigned to engage in other business.

Paul M. Chamberlain has opened an engineering office at 1522 Marquette Building, Chicago. He was graduated from the Michigan Agricultural College in 1888 and from Cornell University in 1890, and has had a wide practical experience. He will devote his time to new design and improvement of existing installations.

J. R. McWane, vice-president and general manager of the American Cast Iron Pipe Company, is expected to return to Birmingham, Ala., about December 15, afer a month's absence in Europe.

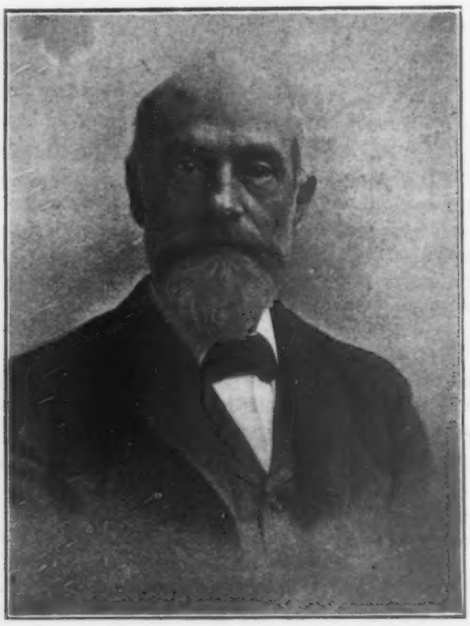
The Stevens Engineering Society, Stevens Institute of Technology, Hoboken, N. J., has issued a neat pamphlet giving an elaborate programme of its lectures for the season of 1909-1910. The society is affiliated with the American Society of Mechanical Engineers. Some of the lectures have already been delivered. Those to come are in part as follows: Rear Admiral Melville, December 14, on "Essentials of Naval Efficiency in an Age of Engineering"; Henry G. Stott, January 4, on "Engineering Efficiency"; Huson Maxim, January 11, on "Warfare of the Future"; T. Commerford Martin, January 18, on "Features of Electrical Development." These subjects indicate the character of the lectures, which run up to May 10. They begin at 4.10 p.m. and are held at the college in Hoboken.

The American Anti-Boycott Association, 27 William street, New York, has issued a 30-page pamphlet, entitled "Industrial Peace and Industrial Efficiency," which gives an account of "the Treaty of the Hartlepools," namely, the copartnership scheme devised by Sir Christopher Furness and adopted in the shipbuilding industry of that section of England.

OBITUARY.

WILLIAM METCALF.

William Metcalf, Pittsburgh, died December 5, aged 71 years. He was born in Pittsburgh, was graduated from Rensselaer Polytechnic Institute, Troy, N. Y., in 1858, and engaged in the foundry business in Pittsburgh. He was superintendent of the Fort Pitt Foundry during the Civil War and turned out many of the heavy cast iron guns used in United States fortifications. He engaged in the manufacture of crucible steel in 1868, and his firm, under the name of Miller, Barr & Parkin, and later Miller, Metcalf & Parkin, distinguished itself for the production of high grade tool steel. In 1886 the firm



WILLIAM METCALF.

was incorporated as the Crescent Steel Company. On the organization of the Crucible Steel Company of America his firm was merged in that company, and in 1895 he started a new crucible steel company, named the Braeburn Steel Company, of which he was president up to the time of his death.

Mr. Metcalf not only attained a high reputation in the steel trade, but was eminent in other lines. He served a term as president of the American Society of Civil Engineers and was also honored with the same position in the American Institute of Mining Engineers. He was a vice-president of the American Iron & Steel Association, a vice-president of the American Society of Mechanical Engineers and a member of the Institute of Civil Engineers of Great Britain and of the Engineers' Society of Western Pennsylvania. He wielded a ready pen and wrote several books recognized as standard works on the treatment of steel, besides contributing numerous articles to magazines and technical journals and papers to the societies of which he was a member. He leaves a widow, three sons and three daughters.

ALDEN SAMPSON 2d, Pittsfield, Mass., manufacturer of motor trucks, died December 3, aged 31 years. Born in New York in 1878, he was taken to Pittsfield when a boy, and having an aptitude for mechanics learned the machinist trade. Having ample private means he became actively interested in the development of automobiles, and of recent years specialized on motor trucks. Five years ago he built a large machine shop. He was about to begin the manufacture of a new truck when attacked by his last illness.

SAMUEL R. BEARDSLEY, president of the Vulcan Detinning Company, New York, died suddenly December 5. He had been president of the company four years. Resolutions setting forth their appreciation of his worth were adopted by the directors at a special meeting held December 6.

The Mechanical Engineers' Convention.

In spite of the disagreeable weather that marked the opening of the thirtieth annual convention of the American Society of Mechanical Engineers in New York, Tuesday evening, there was a very goodly attendance. Again the systematic handling of the registering showed its advantages in the avoidance of confusion and unnecessary delay. The one thing that might have been criticised was that the new requirement of a card admitting to the auditorium to hear the president's address by the arrangement adopted also excluded access to the coat-room until such card was presented, and as this card was not procurable until registration it compelled the members and visitors to wait in their wet garments until they had registered.

The opening address by President Jesse M. Smith is given in full in another part of this issue. There followed the report of the tellers on the election of new officers, whereupon the president declared elected for president for one year George Westinghouse, Pittsburgh, Pa.; for vice-presidents for two years, Charles W. Baker, New York; W. F. M. Goss, Urbana, Ill., and E. D. Meier, New York; for managers for three years, J. Sellers Bancroft, Philadelphia, Pa.; James Hartness, Springfield, Vt., and H. G. Reist, Schenectady, N. Y.

The president called upon Past Presidents Warner, Melville and Wellman to escort the president-elect to the platform, and in a few words Mr. Westinghouse expressed appreciation of the honor conferred upon him and promised his best endeavors to support and advance the interests of the society during his administration. Secretary Rice seconded the remarks of President Smith bearing upon the desirability of having the society well represented at the joint meeting to be held with the Institution of Mechanical Engineers of Great Britain in England next July, and also called attention to the fact that the regular semi-annual meeting of the society in this country will not be omitted. It is to take place in May at Atlantic City, N. J.

For the remainder of the evening a reception to the retiring and newly elected officers was held in the society's room on the eleventh floor of the Engineering Societies' Building. The business and professional sessions and excursions, held and to be held December 7 to 10, inclusive, as outlined in the programme previously printed, will be reported in *The Iron Age* of December 16.

Labor Notes.

About 100 molders in the plant of the West Allis Malleable Iron & Chain Belt Company struck for a restoration of 10 per cent. reduction, which is said to have been made in their wages two years ago. It was shown by President Hollister that the full demands of the men could not be granted at present, one of the reasons being that a large amount of work is on hand taken at relatively low prices, and early this week a satisfactory adjustment of the difficulty was reached.

"Learn a Trade" is the motto of Indiana State Statistician J. L. Peetz, who opened a free employment bureau in Indianapolis in September, operated by the State. At present he has over 50 places for brass molders, plumbers, steam fitters, sheet metal workers, straight lathe operators, machinists, boiler makers, tool makers, &c., but no applicants to fill them. In the class of common laborers he has four applicants for every job, due to some extent to the coming on of winter and the desire of laborers for inside work.

The twenty-seventh annual coal report of the Illinois Bureau of Labor Statistics, covering the year ending July 1, 1908, has been received from David Ross, secretary, Springfield, Ill.

The Franklin Steel Company, Franklin, Pa., is taking bids on a number of motor driven alligator shears and a 9-in. motor driven bar mill.

The American Rolling Mill Company.

Large New Mills for the Manufacture of Ingot Iron Sheets.

The operations of the American Rolling Mill Company at Middletown, Ohio, are an interesting example of the development of a specialty in steel manufacture. A little less than 10 years ago the company's sheet mill was located on a plot of 20 acres in the extreme southern part of the city, along the Miami and Erie Canal. An additional six-mill sheet plant at Zanesville, Ohio, was acquired in the course of time and this was kept busy on the surplus steel made at the Middletown open hearth works. The success attained by the company's American ingot iron has called for a great enlargement of operations and an additional stock issue of $3,000,000 will provide for the new plant, on which preliminary work has begun. The site is on the east side of Middletown, about a mile from the present plant, with which it will be connected by private switches. The city of Middletown has co-operated with the company in providing this site, in opening streets and affording necessary sewerage facilities. Abundant water is furnished by the Miami River and by spring fed supplies found but a short distance below the surface of the ground. Thus there will be no difficulty in meeting the water requirements of the new mills, which are estimated to reach ultimately 10,000,000 gallons a day. Bids on the construction work are expected to be in within the next two weeks, and it is planned to have the new works in operation by the spring of 1911. The design and superintendence of construction are in the hands of A. B. Neumann, who had a part in the engineering work at Gary, Ind.

New Plate and Sheet Mills.

The plans call for four 65-ton open hearth furnaces, and ample room is provided so that the ultimate extensions will give a capacity several times that of the present sheet mills, which is 50,000 tons a year. Eight new sheet mills will be built at the start. The present Middletown plant has four and the Zanesville plant six. A 40-in. blooming mill will be built, and the new soaking pit furnaces will be of capacity sufficient to take care of the output of both groups of open hearth furnaces. There will be a 24-in. billet and sheet bar mill with a bull head stand; two plate mills, 72 in. and 96 in. respectively; two 24-in. sheet and jobbing mills and eight finishing mills, with necessary sheet, pair and annealing furnaces and other auxiliary equipment. The sheet mills will embody a number of special features, contributing both to tonnage and quality. It is the plan of the company to build eventually one or two blast furnaces.

The research work attending the development of the American Rolling Mill Company's product has been a prominent feature of its operations. To provide for the maintenance and further extension of this work a $40,000 research laboratory is to be erected near the offices of the company. It will be a two-story building, 40 x 60 ft., with large basement, half above ground. It is expected to be ready for occupancy in May, 1910. The basement will contain the apparatus of the physical laboratory, the first floor will be given over entirely to the testing of sheets for use in electrical work, and the chemical and microscopical laboratory will be located on the second floor. The equipment throughout will be the most modern apparatus employed in such work. Metallographic research will be an important feature.

Sheets of High Resistance to Corrosion.

For the past seven years the company has conducted extensive investigation and experiments with a view to securing sheets with the greatest resistance to corrosion. It is now claimed that the modifications of the ordinary open hearth process developed at Middletown have resulted in the largest possible elimination of the impurities which shorten the life of steel sheets. Under the designation "American Ingot Iron, 99.94 per cent. pure" this product has been brought forward and in the past few years has been increasingly used where rust resistance was a prime requirement. In a discussion before the Iron and Steel Institute at London in May, 1909, the following statement was made by Dr. Allerton S. Cushman, Washington, D. C.: "It seems to be a fact that carefully made open hearth metal in which the ordinary impurities are cut down to mere traces and in which the heat treatment has been carefully controlled is much more resistant to corrosion than the ordinary types of metal with a comparatively high percentage of impurities. This pure iron is from pure pig iron and carefully selected high grade scrap. There is no mystery about its manufacture, everything depending from start to finish on the heat treatment which the metal receives. In the opinion of the author resistance to corrosion is attained largely by a study of the proper heat treatment of the metal and by the amount of working which it has received both in the hot and cold rolls. Up to the present time this pure iron manufactured by a steel process has been used for the preparation of sheets and plates only. It has been demonstrated, however, that wire can be made from it. The demand for this type of metal appears to be growing and it has been largely used for the manufacture of road culverts."

The manufacture of corrugated culverts is an important part of the business of the Middletown mill. The shipments of culverts manufactured from ingot iron last year amounted to 12,000 tons. The buildings in the manufacturing department in which are made, in addition to culvert stock, corrugated roofing (black and galvanized), siding, metal lath for partitions, Kuehne's clincher lath for ceiling and the company's Imperial expanded lath are 1200 ft. in length. A new wareroom has been added recently.

Results of Acid Tests.

An illustration of the ability of pure metal to resist corrosion is given in a test made on two nails of equal weight. A steel nail and one made of American ingot iron were immersed in a 25 per cent. solution of sulphuric acid for 45 min. At the end of the time the steel nail showed a loss of 68.9 per cent., while the loss to the ingot iron nail was 4.13 per cent. A comparative corrosion test was also made on pieces of steel, charcoal iron and ingot iron sheets of the same size and about No. 14 in gauge. The three were immersed in a 25 per cent. sulphuric acid solution for three hours. The loss of the steel piece was 89.6 per cent.; of the charcoal iron, 50.7 per cent., and of the ingot iron, 1.4 per cent. It is conceded that this accelerated acid test does not reproduce the conditions of a service test, but it is offered as presenting some comparison of the relative resistance of the three metals to corrision.

A number of improvements are under way at the present Middletown plant. Having its own foundry, which has been extended in recent years, the company manufactures its annealing boxes, bottoms and floors, galvanizing pots and a large part of its own machinery. A third open hearth furnace of 50 tons capacity is nearing completion. Last summer a number of new method pickling tanks were installed in the galvanizing department, together with two new galvanizing pots, and two more of the latter will shortly be added. At present natural gas is used, and it is the expectation to employ it at the new plant. The latter will also be equipped with gas producers, as are the present open hearth furnaces. The question of power in the new plant has not been definitely decided. Electric drives may be employed for the sheet and jobbing mills.

The Illinois Farmers' Hall of Fame.—The Illinois Farmers' Hall of Fame is the result of a movement to record the services and commemorate the lives of the great leaders of the State in the development of agriculture from a pioneer art to a civilized science. It is situated at the College of Agriculture of the University of Illinois at Urbana, and each subject chosen is to be represented by a painting and a tablet reciting in brief his contribution to the evolution of agriculture. The first name to be thus installed is that of Cyrus Hall McCormick, the inventor of the reaper. The exercises attending the installation of this name will be held December

15. An elaborate programme has been prepared. Among the speakers on that occasion will be La Verne W. Noyes, Chicago, president of the Illionis Manufacturers' Association, whose subject will be "The Manufacturer and the Farmer." The portrait will be unveiled by a granddaughter of Mr. McCormick.

The Effect of Titanium on Steel.

With Special Reference to the Results Obtained in Rail Steel.

In the issue of *Stahl und Eisen* for October 13, 1909, an article appeared on "The Influence of Titanium on Steel," written by E. von Maltitz, who was the metallurgical engineer at the South Chicago plant of the Illinois Steel Company. The paper gives the results of experiments carried out by him on Bessemer rail steel. In the first part of the article the prevalence of iron ores containing titanic acid is spoken of, and reference is made to the important work done in this country by A. J. Rossi, leading to the use of such ores in the blast furnace. It is stated that in 1907, 750,000 tons of these ores from the Adirondacks were smelted in American blast furnaces and over 1,000,000 tons in 1908. Titaniferous ore is also said to have been used successfully in the basic open hearth process for thinning the slag, thus replacing fluorspar and helping in desulphurization.

Iron-Titanium Alloy and Its Effect on Nitrogen and Oxygen.

The writer then speaks of metallic titanium, the methods of its production and the necessity of using, for steel making or foundry work, an alloy of iron and titanium. Experience has shown that the best results follow the use of an alloy with from 10 to 15 per cent. titanium. This is the alloy taken by the steel works, already a considerable number, which use ferrotitanium in the United States. It is added as the metal, either steel or pig iron, runs into the ladle, as is done with ferromanganese and ferrosilicon. As with these alloys it is necessary that it should come into immediate contact with the metal, not the slag, or its solution will be prevented and it will not affect the metal. It is unnecessary to make smaller the alloy as purchased or to previously heat it. The 10 to 15 per cent. alloy goes almost instantly into solution.

It is good practice to wait, after the addition of the alloy, before pouring the metal in order to allow the slag formed by the strong attraction of titanium for the oxygen and nitrogen present in the metal to rise to the surface. A sample of slag from the upper part of the pipe of a titanium steel ingot contained 38.52 per cent. titanic acid. The alloy should be added after the other materials, such as coal, ferromanganese and ferrosilicon have been added.

Almost a column is then devoted to the work of Braune and others on the amount of nitrogen found in steels of various kinds and its influence. The writer found from 0.013 to 0.015 per cent. nitrogen in ordinary Bessemer rail steel, and only from 0.004 to 0.005 per cent. in rail steel to which had been added 1 per cent. ferrotitanium. The alloy mentioned in this and succeeding work contained from 10 to 15 per cent. of titanium and on the average 14 per cent. The methods of analysis are not given.

From the very strong affinity of titanium for oxygen it is certain the use of the alloy affords a means of making perfectly deoxidized steel.

Another advantage is the greatly lessened amount of segregation found in ingots of titanium treated steel, and in the original paper a table is given of results on four rail steel ingots. Reference is also made to the piping of these ingots.

Results with Bessemer Rails.

An account is then given of the results already obtained in this country in the use of Bessemer steel rails treated with the alloy. The first are those from the Kessler curve of the Baltimore & Ohio Railroad, where 7 ordinary Bessemer rails and 17 ferrotitanium rails were laid. The rails were 100 lb. to the yard, and were laid on October 7, 1908. On February 2, 1909, they were carefully measured. The ordinary Bessemer rails showed a loss of 4.17 lb. per yard, while the special rails only showed 1.45 lb. They were again measured on April 1, 1909, seven weeks later. During this period the special rails lost 0.095 lb. per yard, but the ordinary rails 0.73 lb. per yard. These and other results show that the ferrotitanium rails do not lose their superiority with age.

Photographs of the rails are given, and a sheet of profiles showing the exact shape of the heads when measured by R. W. Hunt & Co. July 8, 1909. At that time the wear of the ordinary rails had been 294 per cent. greater (about 10 lb. to the yard) than the special rails, which were yet in good condition. They had proved to be almost three times as good as the ordinary rails, and it is thought they will give about six times the wear before having to be removed.

The New York Central Railroad is next spoken of, whose ferrotitanium rails have been made chiefly by the Lackawanna Steel Company. Up to the spring of this year this railroad had obtained not less than 14,000 tons, 5000 tons for the electrical division from Mt. Vernon to New York, 7000 tons for the Boston & Albany and 2400 tons for the very sharp curves of the Pennsylvania division. The good results obtained with these rails in New York have already been published in *The Iron Age*. Particulars are then given of chemical and physical examinations of these rails, carried out in the steel works. The amount of alloy employed was from 0.5 to 1 per cent.

In Table I are given chemical results to show the homogeneity of the rails. In the original paper results are given on seven heats, but here only three are given, which are fully representative of them all. The A, B and C are respectively the top, middle and bottom rails of the ingot. Drillings marked "1" were taken near the upper left corner of the head; those marked "2" from the junction of the head and web, and "3" from the flange under the web. They show splendid homogeneity and the segregation of phosphorus and sulphur is very small.

Table I.—Analysis Showing Homogeneity.

Heat No.	Rail.	Sample.	Carbon.	Sul.	Phos.	Mang.	Sil.
27,207	A	1	0.57	0.041	0.099	0.90	0.135
	A	2	0.55	0.041	0.095	0.87	0.160
	A	3	0.57	0.045	0.100	0.87	0.143
	B	1	0.58	0.045	0.100	0.88	0.137
	B	2	0.59	0.047	0.099	0.90	0.138
	B	3	0.60	0.043	0.101	0.87	0.136
	C	1	0.50	0.045	0.094	0.89	0.143
	C	2	0.53	0.040	0.091	0.84	0.155
	C	3	0.53	0.037	0.096	0.90	0.143
27,306	A	1	0.58	0.055	0.095	0.86	0.129
	A	2	0.54	0.053	0.099	0.89	0.133
	A	3	0.54	0.059	0.095	0.84	0.134
	B	1	0.57	0.059	0.099	0.87	0.122
	B	2	0.55	0.053	0.095	0.86	0.128
	B	3	0.55	0.056	0.096	0.85	0.130
	C	1	0.55	0.056	0.093	0.84	0.136
	C	2	0.55	0.054	0.095	0.85	0.128
	C	3	0.55	0.059	0.094	0.88	0.130
27,428	A	1	0.54	0.054	0.094	0.85	0.159
	A	2	0.53	0.065	0.099	0.82	0.156
	A	3	0.52	0.063	0.095	0.82	0.158
	B	1	0.56	0.053	0.097	0.86	0.155
	B	2	0.56	0.063	0.099	0.82	0.158
	B	3	0.55	0.057	0.098	0.85	0.164
	C	1	0.51	0.052	0.096	0.82	0.160
	C	2	0.52	0.053	0.095	0.81	0.153
	C	3	0.52	0.054	0.097	0.83	0.150

In Table II are given the average results on these seven heats:

Table II.—Average Analyses.

Heat No.	Carbon.	Sul.	Phos.	Mang.	Sil.
27,207	0.55	0.043	0.097	0.88	0.143
27,209	0.52	0.038	0.097	0.85	0.141
27,306	0.55	0.056	0.095	0.86	0.130
27,307	0.55	0.054	0.099	0.86	0.136
27,424	0.55	0.042	0.097	0.82	0.158
27,426	0.54	0.046	0.098	0.82	0.165
27,428	0.53	0.057	0.096	0.83	0.156

The drop test results are given in Table III. The rails, 85 lb. to the yard, were cut into lengths 3 ft. 6 in. and laid on supports 3 ft. apart. The hight of the drop was 17 ft. and the weight, 2000 lb. Three blows were given on the head, the deflection being measured; then

the rail was turned over and the blows given on the base. The deflections are given in inches.

Table III.—Drop Test Results.

	Blows.						
Heat No.	1.	2.	3.	4.	5.	6.	7
27,207	1.3	2.5	3.5	Straight.	Broke.	.....	.....
27,207	1.4	3.5	3.6	Straight.	Broke.	.....	.....
27,209	1.4	2.6	3.9	Straight.	Broke.	.....	.....
27,306	1.5	2.7	4.0	Bent other way.	As before.	As before.	Test stopped.
27,306	1.5	2.1	4.1	Straight.	Broke.	.....	.....
27,307	1.5	2.1	4.1	Broke	.....	.....	.....
27,424	1.4	2.7	3.9	Straight.	Quite straight.	Bent.	24 ft. broke.
27,424	1.4	2.7	4.1	Straight.	Broke.	.....	.....
27,426	1.4	2.2	3.4	Straight.	Broke.	.....	.....
27,426	1.5	2.7	3.9	Straight.	Quite straight.	Test stopped.	.....
27,426	1.6	1.9	4.1	Straight.	Flange broke.	.....	.....
27,428	1.6	3.1	4.4	Bent.	Broke.	.....	.....
27,428	1.6	3.1	4.2	Bent.	Flange broke.	.....	.....

The results of the tensile tests are shown in Table IV. In comparison with normal Bessemer rails these rails show an undoubted raising of the elastic limit and a marked increase in the ultimate stress, which with normal rails are about 80,000 and 114,000 lb., respectively, while there is very little difference in the ductility. It is not said how the elastic limit was determined, nor are the dimensions and locations of the test pieces given.

Table IV.—Tensile Tests.

Heat No.	Rail.	Elastic limit. Pounds per square inch.	Ultimate stress. Pounds per square inch.	Elongation. Per ct.	Reduction of area. Per ct.
27,207	A	90,170	120,900	15.0	17.1
	A	87,750	121,320	14.0	17.1
	B	86,200	122,600	10.0	10.4
	B	89,320	124,170	10.0	9.8
	C	83,350	115,370	14.0	19.6
	C	82,920	116,480	15.0	19.0
27,209	A	88,610	120,040	15.0	18.0
	A	94,300	121,600	14.0	18.6
	B	92,210	122,600	10.0	12.1
	B	94,580	120,900	12.0	12.8
	C	88,200	111,650	17.0	22.1
	C	87,050	110,510	16.0	22.1
27,306	A	87,750	114,070	14.0	21.5
	A	93,020	114,070	15.0	20.1
	B	88,750	113,360	15.0	22.5
	B	85,500	114,070	16.0	20.9
	C	87,050	112,360	18.0	21.8
	C	87,470	112,360	16.0	22.1
27,307	A	90,030	114,360	15.0	21.9
	A	85,340	114,360	15.0	20.3
	B	86,470	112,360	17.0	21.9
	B	84,200	112,360	16.0	20.2
	C	86,470	109,520	19.0	28.1
	C	83,050	108,900	20.0	28.6
27,424	A	84,620	116,920	15.0	21.8
	A	78,930	117,340	14.0	19.9
	B	88,180	118,200	15.0	18.0
	B	89,750	118,480	14.0	16.0
	C	91,450	115,780	15.0	16.4
	C	89,600	114,350	15.0	21.9
27,426	A	93,440	117,630	15.0	20.3
	A	94,010	118,050	13.0	16.5
	B	92,450	117,630	15.0	16.4
	B	93,440	117,630	16.0	20.3
	C	95,010	115,350	15.0	21.9
	C	89,320	116,460	16.0	23.7
27,428	A	88,180	112,080	16.0	20.6
	A	90,320	112,790	15.0	20.3
	B	83,630	116,060	12.0	15.5
	B	86,760	114,060	13.0	14.4
	C	86,620	114,060	17.0	24.6
	C	88,470	110,940	19.0	24.6

The hardness of the rails was tested with a Brinell ball machine. They proved to be softer than ordinary rails of the same analysis and section, probably due to the finely divided ferrite network. Etching tests are also shown, compared with tests of an ordinary rail, greatly to the advantage of the special steel.

The article closes with a discussion of the increased cost due to the use of the alloy, and a repetition of the methods for its use. G. B. W.

The United Mine Workers of America will meet in annual convention at Indianapolis, Ind., beginning January 18. Thomas L. Lewis, president, says he is not sure that there will be a demand for a general advance in wages, but there will be a demand for a readjustment that will mean an advance in many mining districts. The miners will also ask for an amendment to the contracts so that foremen of mines, as well as miners themselves, will be subject to penalties for violation of the provisions of the contracts.

Condition of the Hardware Trade.

Relative to the condition of the hardware trade, *Iron Age-Hardware* of December 4 says:

The trade enters upon the closing month of the year without any indication of the falling off in the volume of business which is often experienced at this season. Reports from hardware manufacturers are without exception cheerful in tone and refer to the activity in current business and the excellent prospect for next year. One correspondent, a prominent house doing a large business, states that the last three months of 1909 will be the largest three months in its history. More than the usual amount of mail orders is being received by the manufacturers, showing that the merchants feeling the need of goods and perhaps seeing the upward trend of things, are disposed to buy of their own accord without waiting for the persuasive influences of the traveling salesmen. The fact, too, that these orders from both jobbers and retailers come from all parts of the country is a gratifying indication that all sections are enjoying a return to healthful conditions in industry and trade. The liberality with which merchants are buying in some lines which are characterized by a special strength, usually on account of their nearness to the crude material, begins to suggest speculative purchasing in anticipation of higher values. There is much complaint among manufacturers of difficulty in getting material promptly, as the mills are behind in their delivery. If premiums are not actually paid for prompt deliveries, later orders are sometimes given preference over earlier ones placed at what are now regarded as low prices. There is a special difficulty in getting material from Sweden on account of the strike which started in July and was followed in the iron mills later by a lockout of the workmen, thus greatly delaying shipments, the situation here being aggravated by the fact that importers were carrying very low stocks in anticipation of a reduction in the tariff. It is not only in heavy goods that the demand is large, but in many of the finer products. Builders' hardware is a striking example. The manufacturers find it impossible to keep up with the demand, and some of them are working overtime. This condition results from the building which is going on in every part of the country with remarkable, if not unprecedented activity. This in turn is the result of the prosperity which prevails, with which the great crops which are enriching the farmers have much to do. With the growing population and increasing demand not only for things which are necessaries but also for luxuries, there is constant and steady growth in the volume of business, giving manufacturers not only in the staple lines but in the sphere of novelties opportunities which they are not likely to leave unimproved. At the same time the suggestion should come home to merchants throughout the country in the hardware and in many other fields that the assortment of goods they carry should reflect the development of the country, the growing complexity of living, the higher ideals of comfort and refinement which prevail, and the consequent steady increase in the wants of the people.

Contracts booked show that the 11 automobile manufacturing companies of Indianapolis, Ind., will make 20,000 machines for the season of 1910. At the average price of $1,750 a car, the output will have a total value of $35,000,000. It will take 8000 freight cars to carry the machines to their destination, or 320 trains of 25 cars each. The factories of the city must make 67 cars a day during the 300 working days of the year.

Pig Iron Production.

An Increased Rate in November.

Steel Works Furnaces Fall Off While Merchant Furnaces Gain On October.

November, a 30-day month, shows a smaller output of coke and anthracite iron than October—2,547,508 tons, against 2,599,541 tons. However, the rate of production was greater last month than in October. While the daily rate of the steel companies was 734 tons less that of the merchant furnaces was 1095 tons more. Two important furnaces went in in the month—No. 8 Gary, November 23, and the first Aliquippa, December 1. The net gain in the number of active furnaces was 4—a total of 314 on December 1. The Steel Corporation had in blast 100 furnaces producing steel making iron on the first day of this month, against 57 furnaces of independent steel companies. Three Steel Corporation furnaces have blown in since—Steubenville, one Union at Chicago and No. 7 Gary.

The weekly rate of production December 1 was 599,216 tons, against 593,608 tons November 1. This represents an output of 31,600,000 tons a year, estimating charcoal pig iron at 35,000 tons a month.

Daily Rate of Production.

The daily rate of production of coke and anthracite pig iron by months, beginning with November, 1908, is as follows:

Daily Rate of Pig Iron Production by Months.—Gross Tons.

	Steel works.	Merchant.	Total.
November, 1908	32,705	19,890	52,595
December	35,172	20,986	56,158
January, 1909	35,983	21,992	57,975
February	38,367	22,609	60,976
March	36,811	22,421	59,232
April	36,436	21,526	57,962
May	40,531	20,222	60,753
June	45,507	19,149	64,656
July	48,670	19,123	67,793
August	51,354	21,192	72,546
September	55,361	24,146	79,507
October	57,067	26,789	83,856
November	56,333	28,584	84,917

Production of Steel Companies.

Returns from all plants of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel making iron is included in these figures, together with ferromanganese, spiegeleisen and ferrosilicon. These last are stated separately but are included in the first three columns of "total production."

Production of Steel Companies.—Gross Tons.

	Pig.—Total production.—			Spiegeleisen and ferromanganese.	
	1907.	1908.	1909.	1908.	1909.
January	1,406,397	664,415	1,117,823	20,254	12,325
February	1,317,923	745,802	1,073,363	9,402	10,046
March	1,424,827	841,502	1,140,553	13,750	23,743
April	1,446,788	725,548	1,093,092	12,363	22,478
May	1,470,080	759,674	1,256,448	17,823	20,834
June	1,457,230	717,689	1,365,527	15,958	16,516
July	1,452,557	798,639	1,508,762	10,250	17,613
August	1,445,685	897,052	1,591,991	14,932	22,313
September	1,417,153	933,514	1,660,839	8,938	28,148
October	1,514,521	996,481	1,769,094	12,174	25,384
November	1,084,114	981,167	1,689,994	15,882	.....
December	659,459	1,090,339	.....	6,510	....

The number of active furnaces of the United States Steel Corporation and of the independent steel companies, which were running on steel making iron, at the beginning of each month since January appears below:

	Steel Corporation.	Independent Steel Companies.
Furnaces in blast February 1	62	49
Furnaces in blast March 1	65	45
Furnaces in blast April 1	66	39
Furnaces in blast May 1	68	42
Furnaces in blast June 1	77	48
Furnaces in blast July 1	82	50
Furnaces in blast August 1	93	52
Furnaces in blast September 1	97	57
Furnaces in blast October 1	100	57
Furnaces in blast November 1	101	57
Furnaces in blast December 1	*100	57

* Three additional furnaces blown in since December 1.

As only steel making iron is reckoned in the above, the Steel Corporation's merchant iron furnaces in Alabama and its Bay View stack, which is making foundry iron, are not includel; nor are the three Lebanon Valley furnaces of the Lackawanna Steel Company and the Alabama furnaces of the Republic Iron & Steel Company.

November Product by Districts.

The table below gives the production of all coke and anthracite furnaces in November and the four months preceding:

Monthly Pig Iron Production.—Gross Tons.

	July. (31 days)	August. (31 days)	Sept. (30 days)	Oct. (31 days)	Nov. (30 days)
New York	152,249	173,317	176,777	184,075	178,783
New Jersey	19,002	22,765	29,703	32,778	36,444
Lehigh Valley	55,646	58,607	62,332	68,339	66,703
Schuylkill Val.	47,323	48,105	52,234	56,251	56,463
Lower Susquehanna and Lebanon Val.	50,738	54,713	69,252	75,542	71,463
Pittsburgh Dis.	524,102	538,294	548,968	594,652	573,439
Shenango Val.	128,251	143,722	154,614	164,564	157,984
West. Penn	118,904	118,174	125,712	140,338	139,168
Md., Va. and Kentucky	52,551	67,752	64,652	74,327	75,661
Wheeling Dis.	111,620	125,281	126,077	139,832	135,274
Mahoning Val.	196,593	207,887	211,979	220,093	232,230
Central and North. Ohio	148,969	153,797	187,366	213,585	208,559
Hocking Valley, Hanging Rock and S.W.Ohio.	26,872	26,804	30,628	39,921	42,735
Mich.,Minn.,Mo., Wis., Colo.	57,008	61,980	62,601	68,709	62,088
Chicago Dis.	287,106	282,668	300,261	316,673	284,725
Alabama	106,482	139,131	154,353	175,892	184,291
Tennessee, Georgia and Texas	20,015	23,483	27,697	33,970	41,498
Totals	2,103,431	2,248,930	2,385,206	2,599,541	2,547,508

Capacity in Blast December 1 and November 1.

The following table shows the weekly capacity of furnaces in blast December 1 and November 1, the furnaces blown in in November being rated on the records of previous performance:

Coke and Anthracite Furnaces in Blast.

Location of furnaces.	Total number of stacks.	—December 1.— Number in blast.	Capacity per week.	—November 1.— Number in blast.	Capacity per week.
New York:					
Buffalo	16	15	35,294	16	37,268
Other New York	7	2	2,828	3	3,884
New Jersey	8	6	8,504	5	7,815
Spiegel	2	0	0	0	0
Pennsylvania:					
Lehigh Valley	25	16	15,078	16	15,432
Spiegel	3	2	826	2	720
Schuylkill Valley	15	10	14,932	9	12,345
Low. Susquehanna	7	6	8,678	6	9,520
Spiegel	1	1	658	1	590
Lebanon Valley	10	8	7,338	8	8,399
Pittsburgh Dis.	48	47	133,644	48	132,036
Spiegel	3	3	2,959	2	2,240
Shenango Valley	20	18	36,862	18	37,160
Western Penn.	27	19	31,015	19	32,073
Maryland	4	3	6,962	3	6,210
Wheeling Dis.	14	13	31,563	13	33,577
Ohio:					
Mahoning Valley	20	21	55,237	20	52,415
Central and North.	21	20	49,130	19	48,229
Hocking Val., Hanging Rock and S. W. Ohio	15	12	10,671	11	9,155
Illinois and Indiana	30	23	66,365	23	68,110
Spiegel	2	1	845	2	2,156
Mich., Wis. and Minn.	9	8	8,910	6	6,681
Colorado and Missouri	7	4	7,496	4	7,879
The South:					
Virginia	23	12	10,206	11	8,533
Kentucky	5	2	2,058	2	2,002
Alabama	46	20	42,425	29	39,835
Tennessee	18	12	8,382	11	7,924
Georgia and Texas	4	1	350	3	1,420
Totals	410	314	599,216	310	593,608

Among the furnaces blown in in November or on December 1 were the following: One Zug Island at Detroit, Oxford in New Jersey (blast resumed after banking), one Swede in the Schuylkill Valley, one Aliquippa in the Pittsburgh District, Marshall and Bellefonte in western Pennsylvania, Pulaski and one Crozer in Virginia, Zanesville and Hamilton in Ohio, one Gary in Indiana, Spring Valley in Wisconsin, Struthers and Hannah in the Mahoning Valley, one Sheffield Coal & Iron in Alabama and one Rockwood in Tennessee.

Among furnaces blown out last month were one Lackawanna at Buffalo, Port Henry in New York, one Edgar Thomson in the Pittsburgh District, Punxsutawney and one Cambria in western Pennsylvania, Princess in Virginia, one Joliet and one South Chicago in Illinois, one Clifton in Alabama, Rome in Georgia and Sam Lanham in Texas.

A Record of Active Capacity.

The active weekly capacity in coke and anthracite iron has shown the following fluctuations since January 1, 1907, the figures representing gross tons:

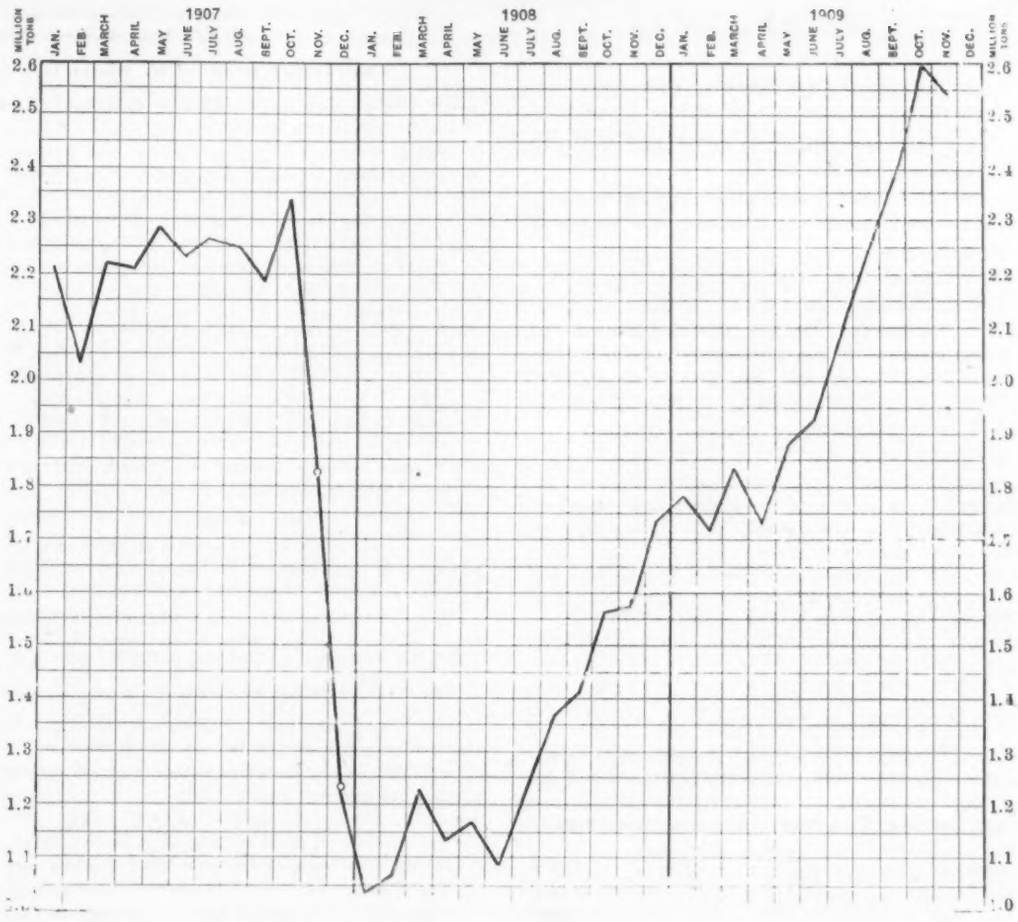


Diagram of Coke and Anthracite Pig Iron Production in the United States in 1907, 1908 and 1909. The dip in the curve in November is due to its being a 30-day month, the rate of production being slightly greater than in October.

	Capacity per week.		Capacity per week.
December 1, 1909	599,216	May 1	268,674
November 1	593,608	April 1	264,890
October 1	565,606	March 1	267,437
September 1	525,037	February 1	241,925
August 1	488,742	January 1, 1908	235,152
July 1	463,029	December 1, 1907	347,372
June 1	446,096	November 1	491,436
May 1	412,010	October 1	511,397
April 1	409,217	September 1	507,768
March 1	420,807	August 1	513,471
February 1	414,497	July 1	528,170
January 1, 1909	401,994	June 1	523,220
December 1, 1908	381,102	May 1	524,538
November 1	362,685	April 1	496,456
October 1	337,925	March 1	511,035
September 1	313,112	February 1	492,359
August 1	284,590	January 1, 1907	507,397
July 1	264,452		
June 1	259,284		

The Curve of Pig Iron Production.

The curve of pig iron production for the past three years is shown in the accompanying chart. The figures plotted in the chart, giving production of coke and anthracite pig iron by months, are as follows:

Production of Coke and Anthracite Pig Iron in the United States by Months in 1907, 1908 and 1909.—Gross Tons.

	1907.	1908.	1909.
January	2,205,607	1,045,250	1,797,560
February	2,045,068	1,077,740	1,707,340
March	2,226,457	1,228,204	1,832,194
April	2,216,558	1,149,602	1,738,877
May	2,295,505	1,165,688	1,883,330
June	2,234,575	1,092,131	1,930,866
July	2,255,660	1,218,129	2,103,431
August	2,250,410	1,359,831	2,248,930
September	2,183,487	1,418,998	2,385,206
October	2,336,972	1,567,198	2,599,541
November	1,828,125	1,577,854	2,547,508
December	1,234,279	1,740,912	.....

The Best Mfg. Company, Pittsburgh, manufacturer of pipe fittings, valves, &c., which is already using Bessemer gas engines of 1000 hp., recently placed an order with the Bessemer Gas Engine Company, Grove City, Pa., for four additional engines, three of 165 hp. and one of 125 hp.

In a recent wreck on the Pennsylvania Railroad, near Jersey City, a steel passenger coach which was turned over on its side had in its lighting equipment nine General Electric tungsten lamps. After the wreck, when all the lamps were taken out and tested, the tungstens were found to be in perfect condition, which is a striking demonstration of the rather remarkable strength and durability of the tungsten filament when specially adapted for train lighting service.

The Franco-Canadian Treaty and the Farm Implement Trade.

TORONTO, December 6, 1909.—The treaty of commerce between Canada and France has now been passed upon by the Canadian Parliament, and the bill embodying it has received the assent of the representative of the crown. All that remains is the formality of exchanging ratifications, the treaty having been confirmed by legislation in France as well as in Canada.

Lyman Jones, president of the Massey-Harris Company, manufacturer of farm implements and machinery at works in Toronto and Brantford, who is a member of the Canadian Senate, has expressed publicly his belief that the treaty will be of great advantage to Canadian makers of agricultural implements. He stated that the benefit was so substantial that it is attracting United Sates manufacturing operations in that department to the Canadian side of the border. He mentioned that in one line goods to the value of $1,000,000 had been manufactured here for export to France in the confidence that the treaty would be in effect before delivery was due. But for this treaty the order in question would never have been filled or undertaken in Canada.

Senator Jones stated that Canada-made agricultural implements are being successfully sold in England, France, South Africa, Australia, Algeria and Argentina against competition with implements made in other countries, notwithstanding that the Canadian implements are the higher priced. That American manufacturers should desire to get on a footing to share in this country's benefits under the treaty was not, in his opinion, surprising. The French duty against the United States exporter of farm implements would be to the French duty against the Canadian exporter of farm implements as $100 to $60.

C. A. C. J.

NEWS OF THE WORKS.

Iron and Steel.

Zug furnace No. 1 of the Detroit Iron & Steel Company was blown in November 29. On the company's No. 2 furnace rapid progress is being made in construction work, but no time has been set for blowing in.

It is reported that the Eastern Steel Company, Pottsville, Pa., is in the market for equipment to be used with two new furnaces.

The Connellsville Iron Works, Connellsville, Pa., is engaged in brazing some mill spindles for the Sabraton and Monessen works of the American Sheet & Tin Plate Company. An inclined structure, about 3 x 60 ft., supporting a 21-in. pipe, is also being fabricated for the Alicia mine at Brownsville, Pa., for use in conveying coal from the tipple to the boiler room. The company is also doing considerable work in building steel cars for mine and industrial service.

No. 2 stack of the Dunbar Furnace Company, Dunbar, Pa., has made an interesting record. It went in blast November 30, 1906, and is still blowing. Up to December 1 it had made 6258 casts, covering 238,920 gross tons of foundry, forge, basic, malleable and car wheel iron. No. 1 stack has just been relined and will go in blast shortly.

The Andrews & Hitchcock Iron Company, Youngstown, Ohio, which has been for some months rebuilding its No. 1 blast furnace at Hubbard, Ohio, expects to blow it in about January 1.

The Sheffield, Ala., Rolling Mill, after being idle two years, resumes operations this week.

The Indiana Steel Company, subsidiary of the United States Steel Corporation, has blown in No. 8 furnace at Gary, Ind., making six stacks now active at this plant.

The Standard Gauge Steel Company, Beaver Falls, Pa., is increasing the capacity of its plant by the installation of additional machinery. Last week the company placed an order with the Fairbanks Company, Pittsburgh, for four Kempsmith milling machines.

Rapid progress is being made in the building of the new tin plate plant of the Phillips Sheet & Tin Plate Company at Weirton, W. Va., near Steubenville, Ohio. The plant will contain eight hot mills and a tinning house, and is expected to be ready for operation early in the new year.

R. W. Oswald, Pittsburgh, representative of the Atlas Engine Works, Indianapolis, Ind., has received a contract for the installation of an 18 x 24 in. heavy duty engine in the Reliance plant of the Allegheny Steel Company, Brackenridge, Pa. The engine is a duplicate of one placed in the plant in 1904.

The machinery equipment that will be installed in the new building of the Shelby Tube Company, at Ellwood City, Pa., is being received. It includes three 10-ton American electric cranes, two cut-off machines, an upsetting machine and a straightening machine.

The Union Sheet & Tin Plate Company, Pittsburgh, is making some improvements in the galvanizing department of its sheet works at Hazleton, Pa. The company expects to start two mills at this plant this month. John McCullough, formerly of the McCullough Iron Works, Wilmington, Del., has been made superintendent of the Hazleton plant.

General Machinery.

The Universal Stone Crusher Company, Cedar Rapids, Iowa, has been reincorporated with capital stock of $500,000 under the name of the Eureka Stone & Ore Crusher Company. The company recently completed a new factory, 60 x 140 ft., two stories, of concrete, brick and steel construction, for the manufacture of stone crushers and other allied machinery. The officers of the new company are: A. H. Newman, president; H. E. Rickel, vice-president; I. L. Mitchell, secretary and manager.

The Reliance Machine Company, Cleveland, Ohio, recently noted, is to operate a general machine shop to do repairing of all kinds, to make tools, perfect patents, &c., and also intends to make a specialty of machining automobile castings.

J. J. McCabe, New York, has purchased the machine shop equipment of Kumberger & Vreeland, New York.

The Crocker-Wheeler Mfg. Company, which has recently secured several large orders for machinery to be used in connection with power developments in Canada, has decided to locate its Canadian works at St. Catherines, Ont.

Charles E. Monday & Co., Philadelphia, Pa., were awarded a Government contract of $168,557 for mechanical equipment in the new Federal Building at New Orleans, La.

The Oklahoma Gas Engine Company, Oklahoma City, Okla., organized with a capital stock of $30,000 to manufacture gas engines, will erect factory buildings to cost $15,000, the first of which will be a machine shop, 50 x 100 ft., with a saw tooth roof. The officers of the company are: Arthur Fishbeck, president and manager; W. H. Clark, vice-president; Geo. W. Lowe, secretary and treasurer.

The property of the defunct Pennman Iron & Steel Company and the plant of the Beaumont Spoke & Handle Company, Beaumont, Texas, including about 30 acres of land, have been bought by W. C. Gray, Jr., of that city. His action is said to be in the interest of a large industrial enterprise to be located there.

The S. G. Hunter Iron Works, which recently succeeded a company of similar name at Atlantic, Iowa, will enlarge its shops and install some new machinery.

The Empire Iron & Steel Company will purchase additional power machinery for its works at Niles, Ohio, in order to provide for operating extensions now in progress.

The plant of the Acme Iron Works, New Iberia, La., has been acquired by Kelly Bros. & Co., who will improve its facilities.

The N. C. Davidson Company, Pittsburgh, is installing a 200-hp. Riverside engine in the power plant of the Kittanning Brick & Fire Clay Company, Kittanning, Pa.; a 17-hp. Jacobson automatic engine in the Park Place Hotel, Sewickley, Pa., and a 10-ton refrigerating plant in the Keenan Building, Pittsburgh.

J. D. Platt, of the Platt Iron Works and Barney Smith Car Company, Dayton, Ohio, has been elected president of the New Era Gas Engine Company, also at Dayton, which recently increased its capital stock and will enlarge its factory and build motor cycles. Pierce Schenck of the Speedwell Motor Car Company and Dayton Malleable Iron Company was elected vice-president.

Foundries.

An iron foundry equipped with cupola furnaces for continuous melting will be part of the new plant which the Fulton Foundry & Machine Works has decided to erect at Atlanta, Ga.

The Clarage Foundry & Mfg. Company, Kalamazoo, Mich., is nearly ready to proceed with the erection of a machine shop, 150 x 215 ft., reference to which was recently made in *The Iron Age*. Machinery will be purchased in the near future.

Interests identified with the New Orleans (La.) Foundry Company have acquired the property, including machinery, of the Union Marine Works, located across the river.

The Fairview Foundry Company, Fairview, Mich., will erect a one-story foundry building, 120 x 320 ft., of reinforced concrete, at Fairview, a suburb of Detroit, Mich.

The Buffalo Cashmeter Company, Detroit, Mich., will build a foundry at Stanton and Grand River avenues.

The foundry of the A. H. Yocom Company, Reading, Pa., manufacturer of gas engines, which is now being erected, will be 65 x 75 ft. Iron, brass and aluminum castings will be produced.

The North Wales Machine Company, North Wales, Pa., has begun the erection of a foundry and machine shop to manufacture power hack saws, grinding machinery, &c., and will be especially equipped to turn out small and medium gray iron castings.

The Auburn Foundry Company, Auburn, Ind., is enlarging its plant and installing the necessary equipment for the manufacture of brass and aluminum castings. The improvements comprise three furnaces and accessories, all of which have been contracted for.

The Sharon Foundry Company, Sharon, Pa., manufacturer of acid open hearth steel castings, has started the foundation for a new 20-ton open hearth furnace, which it expects to have completed and in operation in February.

Fires.

The stove making plant of the Smith Mfg. Company, Bessemer, Ala., was recently destroyed by fire, the loss being about $20,000.

Hardware.

The National Spring Company has been organized and incorporated at New Castle, Ind., with $25,000 capital stock, to manufacture metal springs. The directors are Josiah Fowler, R. R. Fowler and Albert D. Ogborn.

Miscellaneous.

The Ingle Investment Company has been incorporated at Oakland City, Ind., with $30,000 capital stock, by W. D. and David Ingle and others. The company owns a battery of 50 coke ovens at Ayrshire, Ind., not operated for several years. It proposes to rebuild 24 of them, as a new coal mine has been opened near them, again furnishing a supply for the ovens, which had exhausted the old mine nearby. The ovens are of the beehive type.

The Geo. P. Smith Company, Charles City, Iowa, advises that it is its intention to enlarge its plant during the coming year.

The Abbott Motor Company, Detroit, Mich., is erecting a two-story factory, 153 x 190 ft.

The Fireproof Film Company, Rochester, N. Y., Henry Kuhn, manager, 3 Burke Terrace, is having plans prepared for a reinforced concrete factory building, 80 x 500 ft., two stories, to be erected at Lake and Dewey avenues, at an estimated cost of $300,000.

The Carborundum Company, Niagara Falls, N. Y., has let contract to the Turner Construction Company, New York City, for the erection of a three-story crusher building, which it will add to its plant at Niagara Falls.

The Larrowe Valley Company of Detroit, Mich., with offices in the Ford Building, that city, will build an extensive sugar

manufacturing plant at Paulding, Ohio. Contracts for several buildings of reinforced concrete construction have been let to the H. J. Spicker Company, Toledo, Ohio.

Countries Enjoying Canada's Easier Tariff Terms.

TORONTO, December 7, 1909.—Countries that are principal parties with Great Britain in commercial treaties whose most favored nation stipulations apply to the Dominion of Canada are drawing attention to the claim to have their exports admitted into Canada at the same tariff rates as French goods under the new convention between Canada and France. Of those countries Switzerland and Austria-Hungary have had their claims acknowledged and defined. The Canadian Government has advised them through the British Foreign Office that to enjoy the low tariff rates specified in the treaty with France they must conform to a condition France has agreed to—namely, to send their goods to Canada by direct shipment or by way of Great Britain. Switzerland's title to tariff favors is contained in the treaty concluded with Great Britain in 1855. Austria-Hungary's rests on the most favored nation clause of the treaty entered into with Great Britain in 1876.

Several other nations have rights of the same kind, among these being Russia, Denmark, Argentina, Bolivia, Venezuela and Colombia. Japan will also come in for the same benefits as France has secured, but Japan's title does not come from a British Empire treaty. It is contained in a treaty negotiated on Canada's exclusive behalf, so far as British interests are concerned. It is thought to be not improbable that the United States will regard this rather widespread diffusion of the privileges of the French treaty as reasonable ground for applying its maximum duties to Canadian articles. The matter recently came up in the House of Commons. Members on the opposition side suggested that the ratification of the French treaty be not proceeded with, as to bring the treaty into effect might cause the United States to declare is maximum duties against Canada. It is perhaps unnecessary to say that the opposition has never been satisfied with this treaty because of its extending to France trade favors approximating those of the preference granted to Great Britain. The Finance Minister did not agree with opposition speakers as to the likelihood of the United States taking any notice of the treaty with France, and added that if the maximum duties should be imposed Canada could only continue to legislate and negotiate in what it considered to be its own interests, altogether without prejudice to the interests of other countries.

Some time after the Canadian surtax was applied to dutiable imports from Germany, it was observed that there was a quite marked increase in Canada's imports of certain lines from Austria-Hungary. These lines, including hollow ware, were such as the surtax tended to check the importation of from Germany. However the development is to be rightly explained, a theory of it somewhat readily accepted by Canadian manufacturers was that the Austrian goods were of German origin and that Austria was used as a medium of the trade in order to avoid the surtax. It is felt that the concession to Austria of the low tariff rates granted to France may be further taken advantage of for the dodging of the surtax on goods coming from Germany.

Germany's interest in the Canadian market is becoming keener every year. The great expansion in Canada's consumption of steel in all forms since the setting in of the country's present railroad building era have made it more and more an object of German trade policy to have the tariff war between the two countries brought to an end. The envoys sent to Canada by an organization of German traders planned to discuss the matter with boards of trade in all the more important commercial centers of Canada. When they reached Winnipeg, Mr. Nessler, the Berlin representative, had to be taken to the hospital, where, after a short illness, he died from typhoid fever. His colleague continued the campaign and has lately been addressing business men of cities further west.

Canada, as was mentioned in a former letter, is finding it necessary to appoint an agent in London for the purpose of preventing the fraudulent use of British trading connections for the purpose of getting Continental goods into Canada at the rates of the preferential tariff. Goods coming in this irregular way are believed to be of German origin. C. A. C. J.

The Philadelphia Foundrymen's Association.

The regular meeting of the Philadelphia Foundrymen's Association was held at the Manufacturers' Club in that city on the evening of December 1, President Thomas Devlin occupying the chair. The most important business transacted was the nomination of officers to serve for the coming year. The following names were presented by a nominating committee appointed by the presiding officer, composed of George C. Davies, J. S. Hubbs and A. A. Miller, and whose report was approved by the association:

President, Thomas Devlin, Thomas Devlin Mfg. Company; vice-president, Elmer E. Brown, E. E. Brown & Co.; secretary, Howard Evans, J. W. Paxson Company; treasurer, Josiah Thompson, J. Thompson & Co., all of Philadelphia. Executive Committee: Walter Wood, chairman, Camden Iron Works, Camden, N. J.; H. L. Haldeman, Pulaski Iron Company, Philadelphia; Thomas M. Eynon, Eynon-Evans Mfg. Company, Philadelphia; S. S. Knight, Chester Steel Castings Company, Chester, Pa., and Walter T. MacDonald, Schaum & Uhlinger, Philadelphia. Trustees: Thomas Devlin, Josiah Thompson and Howard Evans. Official chemist, George C. Davis, Philadelphia.

After the transaction of routine business, G. Herbert Condict, New York, was introduced and presented a paper prepared by H. McL. Harding, under the auspices of the International Lecture Institute, New York, on "Terminal Freight Handling by Electrical Machinery." The paper was illustrated with numerous lantern slides, showing the developments of the system at many points, both in this country and abroad, which were described in detail by Mr. Condict, who was given a hearty vote of thanks for his interesting address.

The "taxation of corporation" section of the new tariff act was discussed at length and the association, by vote, placed itself on record as being opposed to that measure, considering it unjust in principle and discriminatory in practice, as it puts a burden on mercantile and manufacturing corporations not equally borne by individuals or partnership enterprises.

The monthly meeting of the Mechanical Section of the Engineers' Society of Western Pennsylvania was held in the Fulton Building, Pittsburgh, on the evening of December 7. R. A. Mildon, engineer with the Westinghouse Machine Company, presented a paper on "A Gas Producer for Bituminous Fuel."

The monthly meeting of the Pittsburgh Foundrymen's Association was held in the Fulton Building, Pittsburgh, on the evening of December 6. A. E. McClintock, commissioner of the National Founders' Association, Detroit, Mich., read a paper on "Production of Miscellaneous Machinery Castings and on Molding Machines." His address was illustrated by stereopticon views.

The third annual convention of the National Society for the Promotion of Industrial Education was held in Milwaukee, Wis., last week, opening December 2. It was attended by a large number of prominent persons from all parts of the country and representing a great variety of avocations.

The Wood & Spencer Company, Cleveland, which was recently formed to place a new tapping machine on the market, has also taken up the manufacture of special tools, jigs and fixtures for makers of automobile parts.

The Iron and Metal Trades

Pig Iron Production Increasing.

A New Record in Lake Ore Shipments.

Pig iron production was at the rate of 31,600,000 tons a year December 1, including charcoal iron, or 600,000 tons more than on November 1. Reports from the blast furnace companies to *The Iron Age* show an output of 2,547,508 tons in November, a 30-day month, against 2,599,541 tons in October. The daily rate of the steel company furnaces last month was 56,333 tons, or 734 tons less than in October, while the merchant furnaces increased from 26,789 tons a day in October to 28,584 tons last month. Thus the net increase over the October rate, great as that was, was 1061 tons a day.

Our returns from Lake Superior ore docks show that the total shipments by water in the season which closed this week were 41,684,000 gross tons, against 25,427,000 tons last year. This year's movement was about 400,000 tons more than the record total of 1907. The Steel Corporation's shipments were about 21,500,000 tons, or nearly 1,000,000 tons less than in 1907, the falling off being due to the vessel men's strike early in the season.

Lake ore sellers, it is now practically decided, will soon announce an advance of 50c. on Bessemer ore for 1910 and substantially the same advance on non-Bessemer ore. The metallic iron guarantee, it is now understood, will remain at 55 per cent. for the Bessemer and 51.50 per cent. for the non-Bessemer base ore.

The pig iron market has grown quieter. In eastern Pennsylvania sales of 8000 tons of low phosphorus iron have been made at $22, at furnace. A part of a cargo of Middlesbrough No. 3 iron at Philadelphia, brought over by a merchant firm, was sold at $16, on dock, under pressure to move it. Iron for early shipment and in some cases for first quarter has been quoted slightly below the November market. Some Southern producers are now willing to sell at $14.50 for No. 2 for the early months of next year.

Under offerings by dealers basic iron is weaker in the Central West, and foundry iron has been quoted at $17, at Valley furnace.

So far as information is to be had on stocks, production has about overtaken consumption. In such a situation market tendencies in the next few weeks will be watched narrowly.

The chief development in finished material is the rush of specifications on low-priced contracts which terminate with December. New business, too, has poured in upon some of the large producers at a record rate this month, while others report some slowing down. Inability to make the deliveries wanted is the chief explanation in such cases. New rail orders are chiefly additions to original contracts for 1910. The Harriman lines, for example, have just placed 25,000 tons more. The Mexican Northern is inquiring for 8000 tons.

The new Quebec bridge, which will take 50,000 to 60,000 tons of steel, is up for bids. While the steel will probably be furnished by American mills, domestic fabricators are barred by a 35 per cent. duty. On the New York Municipal Building a 25-000-ton contract, bids are to go in soon, but, owing to the long delivery period and the possibilities of price advances meantime, steel manufacturers are not eager to compete.

Lower prices are named for coke, both for early shipment and on contracts for 1910.

Old material shows little movement apart from that in steel melting stock in eastern Pennsylvania, where the associated mills have taken about 100,000 tons in the past month. Much confusion has resulted from the new procedure of these mills in insisting on a freight allowance equal to the freight to the mill most distant from the point of loading.

The copper market is inactive and prices are yet unresponsive to reports of expected curtailment of production. Tin advanced sharply to-day to 32.25c., against 31.70c. a week ago.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Dec. 8, 1909.	Dec. 1, 1909.	Nov. 3, 1909.	Dec. 9, 1908.
PIG IRON, Per Gross Ton:				
Foundry No. 2, standard, Philadelphia	$19.00	$19.00	$19.00	$17.25
Foundry No. 2, Southern, Cincinnati	17.75	17.75	17.75	16.25
Foundry No. 2, local, Chicago	19.00	19.00	19.00	17.35
Basic, delivered, eastern Pa.	*18.75*	18.75	19.00	16.75
Basic, Valley furnace	*17.00*	17.25	17.25	15.50
Bessemer, Pittsburgh	19.90	19.90	19.90	17.40
Gray forge, Pittsburgh	**17.40**	17.40	17.15	15.15
Lake Superior charcoal, Chicago	19.50	19.50	19.50	19.50
BILLETS, &c., Per Gross Ton:				
Bessemer billets, Pittsburgh	**27.50**	27.50	27.00	25.00
Forging billets, Pittsburgh	**32.00**	31.00	30.00	27.00
Open hearth billets, Philadelphia	30.60	30.60	30.60	26.20
Wire rods, Pittsburgh	**33.00**	33.00	32.00	33.00
Steel rails, heavy, at mill	28.00	28.00	28.00	28.00
OLD MATERIAL, Per Gross Ton:				
Steel rails, melting, Chicago	17.25	17.25	17.25	15.50
Steel rails, melting, Philadelphia	*17.50*	18.00	18.00	16.75
Iron rails, Chicago	*20.00*	20.00	20.50	19.50
Iron rails, Philadelphia	*20.50*	21.00	21.00	21.00
Car wheels, Chicago	18.50	18.50	18.50	16.00
Car wheels, Philadelphia	17.50	17.50	17.50	16.00
Heavy steel scrap, Pittsburgh	**18.00**	17.50	17.50	16.50
Heavy steel scrap, Chicago	16.00	16.00	16.00	15.25
Heavy steel scrap, Philadelphia	*17.50*	18.00	18.00	16.75
FINISHED IRON AND STEEL, Per Pound:	Cents.	Cents.	Cents.	Cents.
Refined iron bars, Philadelphia	**1.65**	1.65	1.62	1.50
Common iron bars, Chicago	**1.60**	1.60	1.55	1.50
Common iron bars, Pittsburgh	**1.70**	1.70	1.60	1.50
Steel bars, tidewater, New York	1.66	1.66	1.66	1.56
Steel bars, Pittsburgh	1.50	1.50	1.50	1.40
Tank plates, tidewater, New York	**1.71**	1.71	1.66	1.76
Tank plates, Pittsburgh	**1.55**	1.55	1.50	1.60
Beams, tidewater, New York	**1.71**	1.71	1.66	1.76
Beams, Pittsburgh	**1.55**	1.55	1.50	1.60
Angles, tidewater, New York	**1.71**	1.71	1.66	1.76
Angles, Pittsburgh	**1.55**	1.55	1.50	1.60
Skelp, grooved steel, Pittsburgh	**1.60**	1.55	1.45	1.45
Skelp, sheared steel, Pittsburgh	**1.65**	1.60	1.55	1.50
SHEETS, NAILS AND WIRE, Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	**2.40**	2.40	2.30	2.50
Wire nails, Pittsburgh*	1.80	1.80	1.80	1.95
Cut nails, Pittsburgh	1.80	1.80	1.80	1.75
Barb wire, galv., Pittsburgh*	2.10	2.10	2.10	2.40
METALS, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**13.75**	13.75	13.25	14.50
Electrolytic copper, New York	**13.37½**	13.25	12.87½	14.12½
Spelter, New York	**6.37½**	6.40	6.30	5.15
Spelter, St. Louis	**6.20**	6.25	6.10	5.00
Lead, New York	4.40	4.40	4.40	4.27½
Lead, St. Louis	**4.30**	4.25	4.25	4.15
Tin, New York	**32.25**	31.75	30.40	29.10
Antimony, Hallett, New York	*8.12½*	8.12½	8.25	8.12½
Nickel, New York	45.00	45.00	45.00	45.00
Tin plate, 100 lb., New York	**$3.84**	$3.84	$3.74	$3.89

* These prices are for largest lots to jobbers.

Prices of Finished Iron and Steel F.O.B. Pittsburgh.

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c. Rates to the Pacific Coast are 80c. on plates, structural shapes and sheets, No. 11 and heavier; 85c. on sheets, Nos. 12 to 16; 95c. on sheets, No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Structural Shapes.—I-beams and channels, 3 to 15 in., inclusive, 1.55c., net; I-beams over 15 in., 1.65c., net; H-beams over 8 in., 1.75c.; angles, 3 to 6 in., inclusive, ¼ in. and up, 1.60c., net; angles, over 6 in., 1.65c., net; angles, 3 x 3 in. and up, less than ¼ in., 1.75c., base, half extras, steel bar card; tees, 3 in. and up, 1.65c., net; zees, 3 in. and up, 1.60c., net; angles, channels and tees, under 3 in., 1.50c., base, plus 10c., half extras, steel bar card; deck beams and bulb angles, 1.80c., net; hand rail tees, 2.80c., net; checkered and corrugated plates, 2.80c., net.

Plates.—Tank plates, ¾ in. thick, 6¼ in. up to 100 in. wide, 1.55c. to 1.60c., base. Extras over this price are as follows:

Tank, ship and bridge quality, ¼-in. thick on edges, 100 in. wide, down to but not including 6 in. wide, is taken as base.

Steel plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, shall be considered ¼-in. plate. Steel plates over 72 in. wide must be ordered ¼-in. thick on edge, or not less than 11 lb. per square foot, to take base price. Steel plates over 72 in. wide, ordered less than 11 lb. per square foot down to the weight of 3-16-in. shall take the place of 3-16-in.

Percentages as to overweight on plates, whether ordered to gauge or weight, to be governed by the Association of American Steel Manufacturers' Standard Specifications.

Gauges under ¼-in. to and including 3-16-in. plates on thin edges	$0.10
Gauges under 3-16-in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
All sketches (excepting straight taper plates varying not more than 4 in. in width at ends, narrowest end being not less than 30 in.)	.10
Complete circles	.20
Boiler and flange steel plates	.10
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Shell grade of steel is abandoned.	
For widths over 100 in. up to 110 in	.05
For widths over 110 in. up to 115 in	.10
For widths over 115 in. up to 120 in	.15
For widths over 120 in. up to 125 in	.25
For widths over 125 in. up to 130 in	.50
For widths over 130 in	1.00

TERMS.—Net cash 30 days. Pacific Coast base, 1.30c. f.o.b. Pittsburgh.

Sheets.—Minimum prices for mill shipments on sheets in carload and larger lots, on which jobbers charge the usual advances for small lots from store, are as follows: Blue annealed sheets, Nos. 3 to 8, 1.70c.; Nos. 9 and 10, 1.75c.; Nos. 11 and 12, 1.80c.; Nos. 13 and 14, 1.85c.; Nos. 15 and 16, 1.95c. Box annealed sheets, Nos. 17 to 21, 2.20c.; Nos. 22 to 24, 2.25c.; Nos. 25 and 26, 2.30c.; No. 27, 2.35c.; No. 28, 2.40c.; No. 29, 2.45c.; No. 30, 2.55c. Galvanized sheets, Nos. 13 and 14, 2.50c.; Nos. 15 and 16, 2.60c.; Nos. 17 to 21, 2.75c.; Nos. 22 to 24, 2.90c.; Nos. 25 and 26, 3.10c.; No. 27, 3.30c.; No. 28, 3.50c.; No. 29, 3.60c.; No. 30, 3.85c. Painted roofing sheets, No. 28, $1.70 per square. Galvanized roofing sheets, No. 28, $3 per square, for 2½-in. corrugations.

Wrought Pipe.—Following are the regular discounts on merchant pipe, subject to the usual additional discounts to larger buyers:

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ in	71	55	65	..
⅜ in	72	58	66	52
½ in	75	63	69	57
¾ to 6 in	79	69	73	63
7 to 12 in	74	59	68	53
Plugged and Reamed.				
1 to 4 in	77	67	71	61
Extra Strong, Plain Ends.				
⅛ to ⅜ in	64	52	58	46
½ to 4 in	71	59	65	53
4½ to 8 in	67	55	61	49
Double Extra Strong, Plain Ends.				
½ to 8 in	60	49	54	43

Boiler Tubes.—Discounts on lap welded steel and charcoal iron boiler tubes to jobbers in carloads are as follows:

	Steel.	Iron.
1 to 1½ in	49	43
1¾ to 2¼ in	61	43
2½ in	63	48
2¾ to 5 in	69	55
6 to 13 in	60	43

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.

To destinations east of the Mississippi River will be sold at delivered discount for carloads lowered by two points, for lengths 22 ft. and under; longer lengths, f.o.b. Pittsburgh.

Wire Rods.—Bessemer, open hearth and chain rods, $33.

Steel Rivets.—Structural rivets, 2.15c., base; boiler rivets, 2.25c., base, subject to usual extras.

Chicago.

FISHER BUILDING, December 8, 1909.—(*By Telegraph.*)

Specifications received by steel mills in this district during the month of November broke all records and were considerably in excess of the monthly capacity of the mills. This refers only to actual specifications. New contracts and orders for November did not quite equal the October record, which was the banner month in that respect. The long hoped for slackening in the demand seems at last to have made its appearance, as the volume of new business is smaller this month. There were no important orders booked last week for standard rails. It is understood that the Western roads have covered their equipments for the early part of 1910, but many of them are expected to come in later with second orders for considerable tonnages. Sales of rails since last August for 1910 delivery as reported in this correspondence have amounted to over 800,000 tons, which will keep the Chicago mills comfortably busy until next fall. In other departments the mills probably have enough business to carry them until June or July, without figuring on the current orders that may be taken during the next six months, and the business now on the books is entirely free from speculative purchases and represents actual consumptive demands. Prices grow a little firmer each month. Last week a consumer paid 1.78c., Chicago, for a 500-ton lot of soft steel bars, and structural material and plates for large contracts are about $1 per ton higher. The new Gary mills promise to relieve some of the pressure for deliveries of bars and light structural material, and other mills under construction at Gary and the South Works will furnish a larger supply of heavy structural plates and shapes. Bar iron is steady in the Chicago District, but some of the smaller outside mills, which are limited in the size they can furnish, have apparently not obtained their share of the business, and offer concessions. Old material is steady, with slight advances in a few lines.

Pig Iron.—It is becoming evident that consumers of pig iron in the Chicago District and the West have have fully covered their requirements not only for the balance of this year, but for the first quarter. The Northern furnaces have little or no surplus iron to trouble them, and the market for Northern grades, while very quiet, is firm. In Southern iron, however, the market has for some time been growing easier each week. Inquiries received by the furnaces from consumers are few and far between, and the resale iron held by speculators has monopolized the market for more than a month. The Southern furnaces are apparently trying to rid themselves of this incubus by forcing the speculative stocks into consumption, and the holders of the iron find it no light task to move their stocks in a saturated market. Their efforts to find buyers aggravate the difficulty by encouraging consumers to hold off, and the weakness in the situation has become so pronounced that the smaller Southern furnaces are now quoting $14.50, Birmingham, for the first and second quarters, although the larger makers are still holding for $15. The current price for resale iron is $14 for No. 2. It is believed that this speculative iron will soon be eliminated from the market, and the Southern furnaces are apparently doing all they can to keep it from dragging over into next year. Real winter has set in through the West the past week, and the foundries are getting more men, but the possibility of railroad strikes interfering with coke shipments and other traffic has a deterring influence for the present on new buying of pig iron. No. 7 furnace at Gary, the sixth one completed, was blown in December 4. The following prices are for December delivery, f.o.b. Chicago:

Lake Superior charcoal	$19.50 to $20.00
Northern coke foundry, No. 1	19.50 to 20.00
Northern coke foundry, No. 2	19.00 to 19.50
Northern coke foundry, No. 3	18.50 to 19.00
Northern Scotch, No. 1	19.00 to 19.50
Southern coke, No. 1	18.85 to 19.35
Southern coke, No. 2	18.35 to 18.85
Southern coke, No. 3	17.85 to 18.35
Southern coke, No. 4	17.60 to 18.10
Southern coke, No. 1 soft	18.85 to 19.35
Southern coke, No. 2 soft	18.35 to 18.85
Southern gray forge	17.35 to 17.85
Southern mottled	17.10 to 17.60
Malleable Bessemer	19.00 to 19.50
Standard Bessemer	21.40 to 21.90
Jackson Co. and Kentucky silvery, 6%	20.40 to 20.90
Jackson Co. and Kentucky silvery, 8%	21.40 to 21.90
Jackson Co. and Kentucky silvery, 10%	22.40 to 22.90

(*By Mail.*)

Billets.—There has been no change in the local situation. Consumers who are able to use old car axles are very active in search of this material, as otherwise they are dependent upon supplies from Eastern mills at prices fixed by Eastern market conditions.

Rails and Track Supplies.—New business was very light last week, amounting to only 5000 or 6000 tons for standard rails. Practically all of the heavy buying by Western roads is over for this year, but it is anticipated that many of the roads will find it necessary to place second orders. One Western road placed a second order recently for 20,000 tons, this having been counted as new business in a former report. The business already taken will carry the mills in this district, including the Gary mill, through the greater part of next year. Current orders for light rails are satisfactory. New business in track supplies has slackened somewhat with the advent of winter weather. We quote standard railroad spikes at 1.80c., base; track bolts and square nuts, 2.30c. to 2.50c., base, all in car lots, Chicago. Light rails, 40 to 45 lb., $26; 30 to 35 lb., $26.75; 16, 20 and 25 lb., $27; 12 lb., $28, Chicago, less 50c. a ton on lots of 500 tons and $1 a ton on lots over 500 tons.

Structural Material.—New structural business continues to come forward steadily. In Chicago the Western Electric Company has let a contract to the Noelke-Richards Company, Indianapolis, which calls for about 1000 tons of structural material for new shop buildings at the Hawthorne plant. The Chicago Telephone Company will erect an office building on which the general contract has been taken by Wells Brothers. The steel, amounting to about 1000 tons, has not been purchased from the mills. The American Bridge Company took a 500-ton contract for a new bag house for the United States Smelting & Refining Company at Bingham Junction, Utah, and other important business is pending. While the structural mills have been falling steadily behind by taking new business faster than they can complete work in hand, there will be a large increase in the productive capacity of this district in the near future. The 18-in. merchant mill at Gary is completed and will be

started experimentally this week, and the 14-in. mill will be ready early in January. Both of these mills will roll light structural material, while a new structural mill at the South Works which will handle heavy work is now under construction. These new mills will go a long way toward meeting the demand from the West for structural material. Meantime prices are very firm and contractors find it more difficult to obtain concessions on large projects. We quote plain material from mill, 1.78c. to 1.88c., Chicago; from store, 2c., Chicago.

Plates.—The overwhelming demand for plates which confronts the mills has caused a gradual stiffening in prices the past fall, and the buyer who wants a large tonnage is unable to make much impression in the market, a large order being more difficult to place than a small one. In fact, there has been an advance of $1 per ton recently over the price that could be done a short time ago on the most attractive specifications. The difficulty in getting satisfactory deliveries will probably continue several months, until the large plate mills at the Gary Works are ready for operation. We quote mill prices at 1.78c. to 1.88c., Chicago; store prices, 2c., Chicago.

Sheets.—Buyers were so prompt in taking advantage of the opportunity recently afforded to place contracts covering their requirements for the first half that there is little of interest at present in the sheet market. Prices are firm at the regular mill quotations, and the business done for the first half has come so near covering the mill capacity that regrets are expressed in some quarters that a larger advance was not made last month. We quote mill prices as follows, Chicago: No. 10 blue annealed, 1.93c.; No. 28 black, 2.58c.; No. 28 galvanized, 3.68c. Prices from store, Chicago, are: No. 10 blue annealed, 2.25c. to 2.35c.; No. 28 black, 2.90c. to 3c.; No. 28 galvanized, 4c. to 4.10c.

Bars.—The Western market is reaching a position of independence in the supply of bars. The 18-in. merchant mill at Gary is completed and will be started this week, the 14-in. mill will be ready early in January and the three smaller mills will follow in due time. These five mills are rated at the nominal aggregate capacity of 50,000 tons per month, but the actual production may be considerably larger, as the performance of other Gary mills when completed has exceeded the estimates of their capacity. This will give the Chicago-Milwaukee District a merchant mill production of more than 1,000,000 tons annually, which ought to be ample for all prospective requirements of this market. Meantime buyers find the market stronger than ever and a new bar order of respectable size, 500 tons, was placed last week with one of the independent mills at 1.78c., Chicago. Iron bars are not able to keep up with this strenuous pace of soft steel bars, but are quoted by the leading mills at 1.60c. to 1.65c. Some of the outside mills are shading these prices on such sizes as they can roll, but have difficulty in getting their share of the trade, while the larger mills are booked ahead comfortably for several months. We quote as follows: Soft steel bars, 1.68c. to 1.78c.; bar iron, 1.60c. to 1.65c.; hard steel bars rolled from old rails, 1.60c. to 1.65c., all Chicago.

Merchant Steel.—The leading mills in the merchant steel trade discourage new buying wherever possible, as they have taken about as much business as they will be able to handle during the first half of 1910. Consumers are so urgent in calling for shipments on their specifications that all efforts are centered on the problem of taking care of the consumptive demand.

Cast Iron Pipe.—Winter weather and the near approach of the holidays have checked interest in the market for both gas and water pipe, and it is not expected that there will be much activity in municipal lettings until after the first of the year. There is a fair volume of jobbing business, including orders from railroads for culvert pipe. On current business we quote, per net ton Chicago, as follows: Water pipe, 4-in., $28.50; 6 to 12 in., $27.50; 16-in. and up, $26.50, with $1 extra for gas pipe.

Metals.—The market for copper is a shade easier this week, casting copper reflecting this condition in a more pronounced degree than lake. Consumers are doing quite a little business for immediate shipment, but there is very little buying for future months. Tin, however, is stronger, and is firmly held for higher prices. In spelter there is talk of lower prices, but no actual sales are reported in this market below 6.30c.; large consumers are generally holding off, and refuse to bid more than 6c., but the sellers thus far have maintained a firm attitude. In old metals copper wire is lower, but tin foil and block tin pipe are 1c. higher. We quote as follows: Casting copper, 13¼c.; lake, 13⅜c., in carloads, for prompt shipment; small lots, ⅛c. to ⅜c. higher; pig tin, car lots, 33c.; small lots, 34c. to 35c.; lead, desilverized, 4.40c. to 4.50c., for 50-ton lots; corroding, 4.65c. to 4.75c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 6.30c. to 6.40c.; Cookson's antimony, 10⅜c., and other grades, 9¾c. to 10¼c.; sheet zinc is $8, f.o.b. La Salle, in car lots of 600-lb. casks. On old metals we quote: Copper wire, crucible shapes, 13½c.; copper bottoms, 11½c.; copper clips, 13c.; red brass, 12½c.; yellow brass, 10c.; light brass, 7c.; lead pipe, 4½c.; zinc, 5.25c.; pewter, No. 1, 23c.; tin foil, 26c.; block tin pipe, 28c.

Old Material.—After several weeks of marked fluctuations, principally downward, the market for old material has been fairly steady in values for two weeks. There is less coming in from the country, and the scrap that arrives on the market is disposed of more readily to consumers so there are no accumulations on tracks at present. Supplies will probably be less from now on, as winter weather will check the operations of country dealers as well as the railroads in gathering up old material, but consumers have generally made provision for the winter by accumulating large stocks. Cast and mixed borings are stronger, as local interests and buyers for Eastern mills are in the market, and there is a little better inquiry for cast scrap as well as for railroad malleable. The following prices are per gross ton, f.o.b. Chicago:

Old iron rails	$20.00 to $20.50
Old steel rails, rerolling	18.00 to 18.50
Old steel rails, less than 3 ft	17.25 to 17.75
Relaying rails, standard sections, subject to inspection	23.50 to 24.50
Old car wheels	18.50 to 19.00
Heavy melting steel scrap	16.00 to 16.50
Frogs, switches and guards, cut apart	16.00 to 16.50
Shoveling steel	15.50 to 16.00

The following quotations are per net ton:

Iron angles and splice bars	$17.50 to $18.00
Iron car axles	21.50 to 22.00
Steel car axles	20.50 to 21.00
No. 1 railroad wrought	14.75 to 15.25
No. 2 railroad wrought	13.75 to 14.25
Springs, knuckles and couplers	14.75 to 15.25
Locomotive tires, smooth	18.25 to 18.75
No. 1 dealers' forge	12.50 to 13.00
Steel axle turnings	12.00 to 12.50
Machine shop turnings	10.50 to 11.00
Cast and mixed borings	7.50 to 8.00
No. 1 busheling	12.75 to 13.25
No. 2 busheling	9.75 to 10.25
No. 1 boilers, cut to sheets and rings	11.50 to 12.00
No. 1 cast scrap	15.00 to 15.50
Stove plate and light cast scrap	12.50 to 13.00
Railroad malleable	15.00 to 15.50
Agricultural malleable	13.00 to 13.50
Pipes and flues	11.50 to 12.00

Birmingham.

BIRMINGHAM, ALA., December 6, 1909.

Pig Iron.—Within the past week some of the producing interests have met the price made on early shipments by the merchants and no report is made of the last named interests having further lowered their quotations. A basis of $14.50, Birmingham, for No. 2 foundry, for shipment prior to the commencing of the second quarter is generally considered the market price, but no such price is quoted by the furnace companies and would not be met by the leading interest. It cannot be said that the $14.50 price can be made applicable to the entire first half, neither can it be said that second-half deliveries would be considered at an advance of 50c. per ton over the $14.50 basis. The actual demand is considerably stronger than at the time of last report. A bona-fide inquiry for 3000 tons for shipment to commence immediately will probably result in a sale to-day, and the aggregate tonnage for comparatively early delivery represented by inquiries pending that have not taken definite form is attractive. A lot of 1000 tons of gray forge was sold the past week at $13.25, Birmingham, and recent efforts to get additional tonnage at that price elicited a quotation of $13.50, or a strict $15, Birmingham basis. Small lots of No. 2 foundry for spot shipment have sold during the week at prices ranging from $14.50 to $15, Birmingham. One or more lots of resale iron are known to have changed hands during the week. It is noted that since furnace companies evinced a disposition to meet the price of merchants, resale lots by parties other than merchants are not so often heard of. The consensus of opinion of the best authorities is that the remaining merchant and resale iron will be sold at figures very close to those now being made in some cases by the furnace companies. It is believed that the demand shortly after January 1 will result in the sale of all tonnage the furnaces are willing to enter at prices now ruling, and that the $15, Birmingham, schedule will again become effective. It is a fact that conditions now existing are due largely to heavy sales early in the year to merchant interests which has resulted in certain brands being brought into competition with themselves when the demand was not strong.

Cast Iron Pipe.—To the list of lettings actually in sight there are added contracts to cover 4000 tons of water pipe for the city of Dallas, Texas, and 2000 to 3000 tons of water pipe for the city of Fort Worth, Texas. There are also contracts for lots of 500 to 1000 tons to be required by municipalities in Texas and Arkansas, all of which will be placed within 60 or 90 days. There has been no change in prices since last report. The small orders placed during the past week brought prices very close to those quoted, but it is understood that an advance would be asked for round tonnage contracts. There is no accumulation on yards of any local concerns and as a whole the market is in a satisfactory condition. We quote water pipe as follows per net ton,

f.o.b. cars here; 4 to 6 in., $26; 8 to 12 in., $25; over 12-in., average $24, with $1 per ton extra for gas pipe.

Old Material.—Inquiries are more numerous, but sales effected the past week are of little significance in the aggregate. Dealers without exception are unwilling to induce buying by revision of quotations, and the prices quoted below are being maintained for the tonnage engaged. Dealers' asking prices are as follows per net ton, f.o.b. cars here:

Old iron axles	$20.00 to $20.50
Old iron rails	16.00 to 16.50
Old steel axles	19.00 to 19.50
No. 1 railroad wrought	14.50 to 15.00
No. 2 railroad wrought	12.00 to 12.50
No. 1 country wrought	12.00 to 12.50
No. 2 country wrought	11.50 to 12.00
No. 1 machinery	13.00 to 13.50
No. 1 steel	12.50 to 13.00
Tram car wheels	12.50 to 13.00
Standard car wheels	14.50 to 15.00
Light cast and stove plate	11.00 to 11.50
Cast borings	6.50 to 7.00

been appointed exclusive sales agent for the Beggs Pipe & Steel Company at Alabama City will be put in operation about January 1.

It is announced that the plant of the Smith Mfg. Company at Bessemer, Ala., recently destroyed by fire, will be rebuilt at an early date.

The Hammond-Byrd Company, Birmingham, Ala., has been appointed exclusive sales agent for the Beggs Pipe & Foundry Company, manufacturer of soil pipe and fittings, whose plant is located at North Birmingham.

Pittsburgh.

PARK BUILDING, December 8, 1909.—(*By Telegraph.*)

Pig Iron.—W. P. Snyder & Co. have sold to the Cambria Steel Company 10,000 tons of Bessemer iron for first quarter delivery at $19, Valley furnace, and about the same tonnage to the Republic Iron & Steel Company for the same delivery and at the same price. Aside from these transactions little has been done. There are increased offerings of basic iron from dealers and prices are weaker and slightly lower. Northern No. 2 foundry iron is also weaker, one or two sellers being willing to book business for first quarter on the basis of $17, at Valley furnace. Malleable Bessemer and forge iron are dull. The starting of one of the new blast furnaces of the Jones & Laughlin Steel Company at Aliquippa will probably make it unnecessary for that company to make any further purchases of Bessemer iron in the open market. We quote standard Bessemer iron, $19, for delivery over first half of next year; basic, $17, for delivery in first quarter; malleable Bessemer, $17.50; No. 2 foundry, $17, and gray forge, $16.50, all at Valley furnace, the freight rate to the Pittsburgh District being 90c. a ton.

Steel.—Undoubtedly the supply of standard sizes of Bessemer and open hearth billets and sheet and tin bars for shipment over the next two or three months is larger, and consumers are having less trouble in having their wants supplied. One local steel mill has contracted for a fairly large supply of sheet bars for delivery over the first quarter at about $29, Pittsburgh. We quote 4 x 4 in. Bessemer billets for prompt delivery at $27.50 to $28, and 4 x 4 in. open hearth billets at $28.50 to $29. It is probable that small lots of both Bessemer and open hearth billets for prompt shipment could be picked up at slightly less than these prices. There is a great scarcity of small open hearth billets and 1½ and 2 in. are quoted as high as $31 to $31.25, maker's mill. Sheet and tin bars seem to be a little more plentiful, but prices are firm. Forging billets are scarce and sales are reported at $32, Pittsburgh.

(*By Mail.*)

The lull in new demand in the steel trade and also on specifications on some lines of finished material is more marked, but it is not causing any decided uneasiness, being attributed to conditions which have always marked the end of each year in the steel trade. One fact is pointed out that is worthy of consideration, and this is that the heavy specifications which the mills have been receiving for three or four months are partly due to the fact that buyers on these contracts have, in many cases, lower prices on them than are ruling now, and as a result are rushing these specifications as fast as possible to stop cancellations by the mills. A good many contracts on finished iron and steel expire with the end of the year, and for this reason specifications are likely to be heavier in December than usual in this month. At last the production of pig iron appears to have caught up with consumption, and at present is slightly exceeding it. There has been a decided lull in the new demand for pig iron in the past two or three weeks, and prices on two grades, basic and foundry, are easier. For a time basic iron was firmly held at $17.25 for this year and $17.50 for next year, but some outside interests have accumulated fairly large blocks of basic, which they are offering for first quarter delivery at $17, at Valley furnace. Notably included in this outside accumulation is about 20,000 tons of what is known as the "Flinn" iron, but which, it is reported, is being held for $18, at furnace. Northern No. 2 foundry is also slightly weaker and $17 can readily be done at furnace. Bessemer is firm, and the Cambria Steel Company has been a recent purchaser. On the standard sizes of Bessemer and open hearth billets the supply seems to be slightly greater, but the market is still firm. Coke continues somewhat quiet, consumers being pretty well covered for the first half. There is a better inquiry for scrap, and heavy melting steel is again firm, at $18 to $18.25, sales being reported at the latter price for delivery at Monessen, Pa. The only change in prices on finished material during the week was an advance of $2 a ton on rivets. The whole market is not likely to show much change for the remainder of this year, but after January 1 a decided improvement in new demand and specifications is confidently expected.

Ferromanganese.—Inquiry in the past week has been quiet, but prices are fairly strong. It is stated that a leading consumer is in the market for a round block for the first half of next year. We quote 80 per cent. foreign at $45 to $45.50, seaboard, for first half of the year, and $46 to $47, seaboard, for second half. A sale of 50 tons for December and January is reported at $45, seaboard.

Ferrosilicon.—New demand continues quiet, no large lots having been sold the past week. A sale of two cars of about 60 tons was made for prompt shipment at a price equal to about $63.50, Pittsburgh. We quote 10 per cent. at $23.90; 11 per cent., $24.90; 12 per cent., $25.90, and 50 per cent., $63.50 to $64, Pittsburgh, for reasonably prompt shipment.

Muck Bar.—A sale is reported of 500 tons of best grade muck bar in random lengths at $30, Pittsburgh. We continue to quote best grades, in random lengths, made from all pig iron, at $30, Pittsburgh, and light bar, cut to lengths, at about $30.50, Pittsburgh.

Wire Rods.—The supply of rods for prompt shipment is limited, and prices are very firm. Most large consumers are pretty well covered into the first quarter and first half of next year and are specifying liberally on their contracts. We continue to quote Bessemer chain and open hearth rods at $33, Pittsburgh.

Skelp.—New inquiry continues active, and several of the leading skelp mills are not in position to take on more orders, being fully sold up for the next two or three months. The continued scarcity and high prices of steel are causing some buyers to ask more money for skelp, and we have made a slight advance in prices. We now quote grooved steel skelp 1.60c. to 1.65c.; wide steel skelp in sheared sizes, 1.65c. to 1.70c.; grooved iron skelp, 1.80c. to 1.85c.; sheared sizes of wide iron skelp at 1.90c. to 2c., f.o.b. at mill, Pittsburgh.

Steel Rails.—No important order for standard sections were booked by the Carnegie Steel Company in the past week, but new orders were received for a little over 2000 tons of light rails. The demand for splice bars has been particularly heavy in the past week or two, and the same company has booked some nice orders for delivery in 1910. We quote steel axles at 1.75c. to 1.80c., and splice bars, 1.50c., at mill, Pittsburgh. Light rail prices are as follows: 8 to 10 lb., $32; 12 to 14 lb., $29; 16, 20 and 25 lb., $28; 30 and 35 lb., $27.75, and 40 and 45 lb., $27, Pittsburgh. These prices are for 250-ton lots and over, and for small lots premiums of 50c. per ton and more are being paid. We quote standard sections at $28, at mill.

Plates.—Several fair sized orders for steel cars were placed the past week, and the steel car companies are now taking a larger tonnage of plates from the mills than at any time in nearly two years. The Woods Run plant of the Pressed Steel Car Company is now in partial operation, turning out about 25 cars a day, and the Standard Steel Car Company is operating its steel car plant at Butler, Pa., night and day, increasing its output to very close to 90 cars a day. Western railroads are figuring on the purchase of a good many steel cars, and the outlook is that the plate mills will have all the work they can possibly turn out in the next four or five months. In fact, the present engagements of the two leading plate mills are so heavy that they are practically sold up through the first three months of next year. Plates for shipment within four to six weeks from date of order readily brings about 1.60c. to 1.65c., at mill. We quote ¼-in. and heavier at 1.55c., at mill, in large lots for prompt shipment, and 1.60c. to 1.65c., for small lots.

Structural Material.—No important local contracts were placed during the week. The mills are making slightly better deliveries, the starting up of the Bessemer plant of the Carnegie Steel Company at Homestead helping the situation a good deal, as the steel made is being rolled into shapes. A good deal of new work is coming up in the East, involving 25,000 tons or more, but it will not be ready for bids for some little time. We quote beams and channels up to 15 in.

at 1.55c., at mill, while small lots for prompt shipment bring 1.60c. to 1.65c., at mill.

Tin Plate.—Plans have been completed by the American Sheet & Tin Plate Company for its new sheet and tin plate mills at Gary, but actual work will not be started until appropriations are made by the Finance Committee of the United States Steel Corporation, which will likely be done this month. The plans call for the building of 68 sheet, tin plate, jobbing and light plate mills. This week the company is operating to full capacity 171 hot tin mills out of 221 serviceable mills, or 77 per cent. of its capacity. This is the largest number of tin mills it has operated since the strike started on July 1, and the output of these mills has been steadily growing heavier. The new demand for tin plate is fairly active, but the mills are running mostly on specifications on contracts taken some time ago, for delivery into first quarter and first half of next year, and which are coming in freely. In some cases premiums of 5c. to 10c. per box are being paid to some of the smaller tin plate mills on small lots of tin plate for prompt shipment. We quote 100-lb. cokes at $3.60 per base box, f.o.b. Pittsburgh, for delivery through the first half of next year.

Sheets.—This week the American Sheet & Tin Plate Company is operating 163 hot sheet mills out of a total of 186 serviceable mills, the only idle plant being the Aetna-Standard Works at Bridgeport, Ohio. Recently about 125 of the old employees at this mill petitioned the company for their old positions, and preparations were made last week to start the mill. This at once brought about riot and disorder on the part of the strikers, and a number of men were seriously injured. The situation was so serious that State troops were called out, and the district was put under martial law. The plant was again closed and the company will not try to start it until the employees are assured of protection. The demand for black and galvanized and roofing sheets continues enormously heavy, and all the mills are from six weeks to three months or longer back in shipments. It is stated that all price concessions have absolutely disappeared. We quote: Blue annealed sheets, Nos. 3 to 8, 1.70c.; Nos. 9 and 10, 1.75c.; Nos. 11 and 12, 1.80c.; Nos. 13 and 14, 1.85c., and Nos. 14 and 15, 1.95c.; one-pass box annealed No. 28 black sheets, 2.40c., and No. 28 galvanized, 3.50c., at mill. We quote corrugated roofing sheets at $1.70 per square for painted and $3 for galvanized, 2½-in. corrugations. Jobbers charge the usual advances over these prices for small lots from store.

Bars.—A good many contracts for both iron and steel bars that were placed some time ago, when prices were lower than they are now, expire on December 31, and any tonnage on these contracts not taken out by that date will be promptly cancelled. For this reason it is expected that specifications on iron and steel bars in December will show a material increase over November, that month having shown a loss compared with October. Railroads have been heavy buyers of iron bars, some large orders having recently been placed. Premiums continue to be paid on both iron and steel bars for reasonably prompt shipment. We quote steel bars at 1.50c. to 1.55c., for delivery within three or four weeks, and in some cases 1.60c., at mill, is being paid for prompt shipments. On contracts from regular customers the mills are still entering orders for steel bars at about 1.45c., at mill, for delivery in first and second quarters of next year. We quote iron bars at 1.70c. to 1.75c., Pittsburgh, for reasonably prompt shipment.

Hoops and Bands.—The new demand is fairly active, but the mills are running mostly on specifications against contracts which are coming in freely. A good many contracts for hoops and bands expire on the last day of this month, and, as most of these were taken at lower prices than are ruling now, it is expected that specifications in December will be unusually heavy. We quote steel hoops for forward delivery at 1.50c. to 1.55c., and for prompt shipment at 1.60c. to 1.65c., at mill. Steel bands are firm at 1.45c. to 1.50c., on contracts for forward delivery, and 1.55c. to 1.60c. for reasonably prompt shipment.

Spelter.—For the first time in several weeks prices on spelter are showing weakness, being slightly lower. We quote prime grades of Western spelter at 6.22½c., East St. Louis, equal to 6.35c., Pittsburgh, and note a sale of 50 tons for December shipment at that price.

Spikes.—No large orders have recently been placed, but there is a good run of general business, and railroads are specifying freely against contracts placed some time ago. One local maker of spikes reports he has sold upward of 5000 kegs on the basis of $1.85, Pittsburgh. We quote standard sizes of railroad spikes, 4½ x 9-16 in. and larger, at $1.80 to $1.85 for first quarter. Boat spikes are firm at $1.80, base, and small railroad spikes at $1.80, base. These prices are for carload and larger lots, 10c. per keg advance being charged for small lots.

Shafting.—The new demand has quieted down somewhat, but specifications against contracts are heavy, consumers desiring to take as much this month as possible, on contracts that expire on December 31. Present discounts are being firmly maintained and we quote shafting at 55 per cent. off in carload and larger lots and 50 per cent. off in less than carloads, delivered in base territory.

Rivets.—At a meeting of rivet makers held in New York City last week an advance of $2 a ton on structural and boiler rivets was made. The demand is referred to as being especially heavy and consumers are specifying freely on their orders. We now quote: Structural rivets, ¾ in. and larger, 2.15c., base; cone head boiler rivets, ¾ in. and larger, 2.25c., base; ⅝ in. and 11-16 in. take an advance of 15c., and ½ in. and 9-16 in. take an advance of 50c.; in lengths shorter than 1 in. also take an advance of 50c. Terms are 30 days, net cash, f.o.b. mill. The above prices are absolutely minimum on contracts for large lots, makers charging the usual advances of $2 to $3 a ton to the small trade.

Merchant Pipe.—Nothing definite has yet been done on the inquiry of the Arkansas Natural Gas Company for about 200 miles of line pipe, and it is likely that the business may not be placed for some little time. New orders and specifications on pipe in November showed a slight falling off as compared with October, and this month will probably show a falling off over November, as the last two months of the year are usually the dullest months in the pipe trade. Discounts in effect on iron and steel pipe are printed elsewhere in this issue.

Boiler Tubes.—The new demand for both locomotive and merchant tubes is fairly heavy. The mills now have a good deal of business on their books for shipment over the next two or three months. We are advised that regular discounts on locomotive and merchant tubes, printed on another page in this issue, are being absolutely held.

Iron and Steel Scrap.—The leading consumer of heavy steel scrap has been a heavy buyer recently, and the demand for this material is more urgent than for some time, while prices are slightly higher. The embargo on scrap destined for Brackenridge, Pa., was lifted yesterday, and this will probably improve the market on turnings and borings, the works located there being the heaviest consumer of such material in this district. Several railroad lists, including the Pennsylvania, the Baltimore & Ohio and the Erie, close this week. The awards of the scrap from these roads, when announced, will give a pretty good line on the whole scrap market. We now quote heavy steel scrap for delivery at Brackenridge, Sharon, Steubenville, Follansbee, Pittsburgh and the Monessen districts at $18 to $18.25, delivered. No. 1 cast scrap continues somewhat weak and is held at about $16.50, and No. 2 at about $15.50. Dealers quote on other grades of scrap about as follows: Low phosphorus melting stock, $21 to $21.25; bundled sheet scrap, $16.25 to $16.50; rerolling rails, $18.50 to $18.75, for delivery at Cumberland, Md., Cambridge or Newark, Ohio; railroad malleable, $16 to $16.25; No. 1 busheling, $15.50; No. 2, $12.50; grate bars, $14 to $14.25; locomotive axles, $28 to $28.25; iron axles, $27.25 to $27.50; steel axles, $21.50 to $21.75; No. 1 railroad wrought scrap, $19 to $19.50; old car wheels, $18 to $18.25; cast iron borings, $10.50 to $11.75; machine shop turnings, $13. Sheet bar crop ends are weak, and we quote these at $18.75 to $19. All the above prices are per gross ton, f.o.b. Pittsburgh.

Coke.—There is not much new demand, consumers of both blast furnace and foundry coke having pretty well covered their requirements for first half of the year. An Eastern furnace interest has closed for 12,000 tons monthly of standard grades of Connellsville furnace coke for delivery over all of next year, on the basis of $2.80 per net ton, at oven, and is reported to be in the market for a further supply of coke. There has been a good rainfall in the last 24 hours, and this will relieve to some extent the shortage in water supply, which has existed for some time in the coke regions. We quote standard makes of furnace coke for first half of next year at $2.80 to $2.85, and best grades of 72-hour foundry coke for same delivery at $3.25 to $3.50 per net ton, at oven.

Cleveland.

CLEVELAND, OHIO, December 7, 1909.

Iron Ore.—It has been practically decided by the merchant ore firms that the price of Bessemer ore will be advanced 50c. a ton for next season, and that the advance on non-Bessemer will be 50c. or very close to it. The ore men may get together late next week and formally decide on the new prices or action may be postponed until about January 1. Unless unexpected less favorable conditions should develop in the meantime that might lead the ore men to feel that the advance is not warranted, it will be made. For some time there has been talk of reducing the guarantee on ores for the coming season, but the present indications are that the existing guarantee of 55 per cent. on Bessemer ore and 51.50 per cent. on non-Bessemer will not be changed. Following the activity of a few weeks ago, during which the bulk of the Bessemer ore tonnage for next year was reserved, the market was quiet for two or three weeks, but now furnacmen are again coming in the market with inquiries and they are anxious to have next year's prices definite-

ly fixed. During the week there were inquiries for two round lots of Bssemer ore, some large inquiries for non-Bessemer, and some reservations of the latter grade. With favorable weather conditions during the last 10 days of navigation, which closed this week, ore shippers were able to get well cleaned up, so that nearly all the ore that was sold has been brought down from the mines. Incomplete figures show that the record of 1907 in the movement of ore was broken, shipments this year being about 400,000 tons in excess of two years ago, when the total movement by water was 41,288,755 tons. Shipments during November were 4,899,220 tons, making the total movement up to December 1, 41,164,359 tons, or only 124,396 tons behind the total movement during 1907. This season's prices at Lake Erie docks, per gross ton, are as follows: Old range Bessemer, $4.50; Mesaba Bessemer, $4.25; Old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.50.

Pig Iron.—The market is extremely quiet on all grades, but prices are holding up well. In foundry grades the only sales reported are a few small lots, and the largest inquiries are for 100-ton lots. A few inquiries have come in for the second half delivery, but furnaces are declining to quote. While one or two furnaces are reported to be shading the Valley price to $17 for No. 2, for prompt shipment and first quarter delivery, the $17.25 price is being generally adhered to, while local furnaces continue to quote No. 2 at $18, at furnace. The furnacemen do not expect much buying before the first of the year, and the present inquiries are for such small tonnages that, as a rule, they are not disposed to offer concessions, hoping to hold up the market until another buying movement sets in. The firm feeling displayed by nearly all the furnacemen is due to the fact that the melt is holding up well. Nearly all the foundries are taking their iron on contract as fast as it can be delivered, and some requests are being made that January shipments be anticipated. For December delivery we quote, delivered, Cleveland, as follows:

Bessemer	$19.90
Northern foundry, No. 1	$18.65 to 18.75
Northern foundry, No. 2	18.15 to 18.25
Northern foundry, No. 3	17.65 to 17.75
Southern foundry, No. 2	18.85
Gray forge	17.40 to 17.65

Coke.—The market is very quiet and prices are not as firm as they have been. While standard Connellsville furnace coke is generally quoted at $2.85 to $2.95 per net ton, at oven, for the first half, what was claimed to be standard coke was offered in the local market this week by an Eastern broker at $2.65 for first half delivery. One local furnace is in the market for its first half requirements. Connellsville 72-hour foundry coke is held at $3.15 to $3.25 for spot shipment and $3.25 to $3.50 for the first half.

Finished Iron and Steel.—There is a very heavy demand for steel bars for early delivery. The supply appears scarcer than ever and consumers, unable to secure shipments as needed from mills with which they have contracts, are making attempts to get material from other sources or are paying jobbers' warehouse prices. Jobbers are unable to get deliveries fast enough from the mills to fill their own orders, the smaller sizes being particularly scarce, and consumers are sending stock orders to Chicago and Pittsburgh warehouses for both steel bars and structural material. The minimum price for steel bars for prompt shipment is 1.60c., Pittsburgh, but sales are reported for quick delivery from mills at prices little under warehouse prices. For future delivery some bar contracts are being closed at 1.45c., Pittsburgh, for first quarter specifications, deliveries to be made during the second quarter. The demand for plate and structural material for early delivery continues heavy in lots ranging from carloads to 200 tons, and consumers are paying 1.60c., Eastern mill, equivalent to 1.79c., Cleveland, for quick shipment. A large part of this business is coming from structural shops, many of which have enough work on hand to keep them busy through the winter. Specifications on contracts are not as heavy as a few weeks ago, but mills are so congested that no improvement in deliveries is noted on either steel bars, shapes or plates. The leading interest is not promising deliveries on bars within four months. The demand for sheets continues heavy and deliveries are getting further behind. Considerable new tonnage has come out for automobile work. Deliveries on black sheets are generally 6 to 12 weeks behind, and mills able to make prompt shipments are now asking a premium of $2 to $4 a ton. Blue annealed sheets have also become scarce. The demand for iron bars is fairly good and prices are stationary at 1.60c. to 1.65c., Cleveland. New business that has developed during the week includes a contract placed by the American Shipbuilding Company with the leading interest for 3750 tons of shapes and plates for a new lake boat. The Diamond Rubber Company, Akron, Ohio, has given the Burger Iron Company of that city the contract for a factory building requiring 1000 tons of structural material. Two new building projects have developed in this city, for which bids will be received soon, each requiring about 1000 tons of steel. One is an office building on Euclid avenue and the other is an addition to the May Company store. The Cleveland Frog & Crossing Company has placed contracts for its rail requirements for 1910, an order for 2000 tons of Bessemer rails going to the Carnegie Steel Company and one for 500 tons of Bessemer or open hearth rails to the Illinois Steel Company.

Old Material.—The market shows little change. The demand continues light. Prices are weak, but show no further decline. Consumers are well covered for the remainder of the year and are buying only what they actually need. There is no demand locally for steel making scrap, but rolling mills are buying small lots of iron-making scrap. There is some inquiry for steel-making scrap for shipment to Sharon and other points in the Pittsburgh District. Foundries are well filled up on cast scrap for the balance of the year and are out of the market. The Norfolk & Western Railroad will receive bids December 15 on a list of about 1500 tons. Prices per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails	$16.50 to $17.00
Old iron rails	20.00 to 20.50
Steel car axles	20.50 to 21.00
Old car wheels	17.50 to 18.00
Heavy melting steel	16.25 to 16.50
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	14.50 to 15.00
Railroad malleable	17.00 to 17.50
Light bundled sheet scrap	11.00 to 11.50

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles	$21.00 to $21.50
Cast borings	9.00 to 9.25
Iron and steel turnings and drillings	10.75 to 11.00
Steel axle turnings	12.00 to 12.50
No. 1 busheling	14.50 to 15.00
No. 1 railroad wrought	17.00 to 17.50
No. 1 cast	14.75 to 15.25
Stove plate	12.50 to 13.00
Bundled tin scrap	11.00 to 11.50

St. Louis.

ST. LOUIS, MO., December 6, 1909.

St. Louis bank clearings for 1909 will far exceed all previous records. The total will reach at least $3,400,000,000. The post office record for receipts is also broken, the total for November being $403,432.40. The dividends payable at the close of the year (not including "closed corporations") aggregate a total of $5,615,377. The indications of further increase in the extension of the mileage of Southwestern railroads are taking shape, owing to the rapid development going on in that section.

Coke.—The principal, if not the only, feature of the coke market for the past week is the free furnishing of specifications on contract coke. We note also a slight weakness in price so far as quotations for spot coke are concerned. However, such inquiry as is being made is mainly for forward shipment, for which there is no disposition to shade current figures. We quote for shipment prior to New Year's $3.25; shipment over the first half, 1910, $3.50 for standard 72-hour foundry per net ton, f.o.b. ovens, Connellsville.

Pig Iron.—Nearly all the leading sales agencies report the receipt of urgent requests for shipments to be made of contract pig iron. These specifications, in many cases, are being furnished in advance of contract time. We hear of but two inquiries for round lots, one house reporting a 1000 ton inquiry for forward shipment, and the other for several hundred tons, also for forward shipment, and in both cases No. 2 Southern foundry. There is some business doing in lots of 100 to 300 tons, but speaking generally, the market is very quiet. Regarding prices, resale iron is still being pressed for sale and offers equivalent to $14, Birmingham, have been accepted for No. 2 foundry for immediate delivery. However, these offerings are so small as not to attract the attention of large consumers, but are being taken by merchant pig iron sellers for meeting orders from the smaller outside buyers. For future shipment the market rules firm at previous quotations. The attention of the trade for the moment is being devoted to getting contract iron shipped and in guessing on the future course of the market. The consensus of opinion is that no large sales are likely to be made until after the turn of the year. Small lots of Southern No. 2 foundry for prompt shipment have been sold at $14.50, but we quote for the first half of 1910 at $15, f.o.b. Birmingham, for all standard brands.

Lead, Spelter, Etc.—The market for lead is steady at 4.25c. to 4.27½c.; spelter is a shade lower, at 6.22½c., East St. Louis basis. Zinc ore is lower, quoted at $49 and $50 per ton, Joplin base. Tin is 25c. per 100 lb. higher; antimony unchanged; copper, ⅜c. per 100 lb. lower. The demand for finished metals continues good.

Old Material.—The dullness in the scrap iron and steel market is becoming more pronounced. There is not only little doing with consumers, but also little disposition to operate on the part of dealers. The whole list is a shade lower and prices more or less nominal. All the offices are busy in getting out contract stuff and not much concern is manifest over present conditions, the dullness being the normal state of the season. The trade will be influenced by the prospective prices in pig iron and the railroad offerings. The

latter are not expected to be heavy during the winter. The Missouri Pacific is out with a list of 2500 tons, and the St. Louis & San Francisco of 800 tons. We quote dealers' prices as follows, per gross ton, f.o.b. St. Louis:

Old iron rails	$17.00 to $17.50
Old steel rails, rerolling	15.50 to 16.00
Old steel rails, less than 3-ft.	14.50 to 15.00
Relaying rails, standard sections, subject to inspection	25.00 to 25.50
Old car wheels	18.00 to 18.50
Heavy melting steel scrap	14.50 to 15.00
Frogs, switches and guards, cut apart	14.50 to 15.00

The following quotations are per net ton:

Iron fish plates	$14.50 to $15.00
Iron car axles	20.50 to 21.00
Steel car axles	19.50 to 20.00
No. 1 railroad wrought	14.50 to 15.00
No. 2 railroad wrought	13.50 to 14.00
Railway springs	13.50 to 14.00
Locomotive tires, smooth	16.00 to 17.00
No. 1 dealers' forge	11.00 to 11.50
Mixed borings	7.50 to 8.00
No. 1 busheling	11.50 to 12.00
No. 1 boilers, cut to sheets and rings	10.50 to 11.00
No. 1 cast scrap	14.00 to 14.50
Stove plate and light cast scrap	10.25 to 10.75
Railroad malleable	12.50 to 13.00
Agricultural malleable	10.50 to 11.00
Pipes and flues	10.25 to 10.75
Railroad sheet and tank scrap	10.00 to 10.50
Railroad grate bars	10.00 to 10.50
Machine shop turnings	10.00 to 10.50

The Secretary of State has issued a charter to the Puxico Iron Company of Cape Girardeau, Mo.; capital stock, $50,000. Incorporators: Charles J. Crawford, Albert J. Meyers and Edward D. Hays.

The Chicago & Alton Railroad has ordered 10 Mikado type consolidated freight engines from the American Locomotive Company for delivery March 1.

The Manufacturers Railway of St. Louis has purchased property near First, Second and Rutger streets to be used to enlarge the terminal facilities of the company in that district.

The German Iron Market.

BERLIN, November 25, 1909.

The tendency of the iron market continues firm, but business remains rather quiet, corresponding with the time of the year. The upward trend of prices is still in progress. On the Düsseldorf Exchange last week the following changes were noted: Spiegeleisen, 62 to 64 marks per ton (last previous quotation 60 to 64 marks); Thomas iron at Luxemburg, 49 to 52 (48 to 51); Luxemburg puddling, 46 to 48 (45 to 47); Luxemburg foundry, No. 3, 51 to 52 (50 to 52); No. 1, 59 to 61 (58 to 60); other foundry, No. 3, 58 to 60 (57 to 59); German hematite, 61 to 63 (60 to 62); bars of soft steel, 104 to 108 (102 to 108); heavy plates, 110 to 115 (108 to 115); boiler plates, 120 to 125 (118 to 123).

In Belgium prices are also moving upward. The manufacturers there raised the price of bars last week to dealers by 5 francs. The new prices range between 132.50 and 145 francs, at point of shipment. Rods were also advanced from 130 to 135 to 132.50 to 150 francs.

Within the past few days it has been reported that the furnacemen are making efforts to effect a price arrangement. It will be recalled by readers of this correspondence that the pig iron syndicates broke down about a year ago. Since then there has been free competition in that article, and prices have been kept so low that all the furnaces would now be glad to see some arrangement brought about for keeping them up. What is now aimed at is an agreement to take no further orders up to January 15 that extend beyond the end of 1910, and it is said that the majority of the furnaces have already promised this. In the meantime it is hoped that a permanent price agreement shall be effected.

The pig iron market is reported as being very quiet, so far as new orders are concerned, the furnaces having mostly sold their entire production in the most salable qualities to the end of next year. Supplementary buying for the current quarter and the following months is at higher prices, which are readily paid. Average furnace prices are about 5 or 6 marks above the lowest level reached last summer. One of the favorable features of the situation is that the great mixed works have for some time been using up their entire make of pig and have quite disappeared from the open market. Under these circumstances the stocks of iron in the market have been reduced to a pretty low figure. The market for scrap iron continues firm, but consumers are disposed to hold off in the hopes of getting easier rates later on.

Several days ago the manufacturers of band iron voted to leave prices unchanged for the present, after having already made an advance last month; but they also decided to take no orders at present prices beyond the first quarter of next year, in order to watch the tendency of the market further before fixing prices for remoter dates. The amount of work on hand was pronounced to be satisfactory.

The October shipments of the Steel Syndicate were rather disappointing, having been about 18,000 tons less than for September. A shrinkage of business in all the three lines of syndicated goods (rails, structural shapes and semi-finished material) was registered, It was reported that of the increased orders recently taken in steel material for further manufacture the lion's share has gone to the foreign market. In steel rails and ties the amount of work on hand remains unsatisfactory, the mills being employed to scarcely 70 per cent. of their capacity. Business in structural shapes has grown quieter.

The tendency of the bar market is also quieter, but this is in the main due to the fact that both dealers and consumers have already bought freely for the first quarter of 1910 and feel no immediate necessity to make further engagements. In some cases dealers are trying to place contracts for remoter dates, but the mills are refusing such offers with the expectation of being able to enforce a further advance of prices.

The machinery shops have just been made happy with orders for 492 locomotives from the Prussian railroad authorities, to be delivered by the end of next September. The orders amount to about 30,000,000 marks.

Germany's exports of iron and steel of all kinds for the 10 months ended with October amounted to 3,219,500 metric tons, against 3,128,500 tons for that period in 1908, and imports to 377,000 tons, against 475,000 tons. The export surplus was 2,842,400 tons, against 2,653,500 tons last year.

The Siemens & Halske Company, Berlin, manufacturer of electrical machinery and equipment, has just declared a dividend of 12 per cent., against 11 per cent. last year. Net earnings amounted to 11,429,000 marks, against 9,688,000. At the same time it was announced that orders on hand are larger than a year ago. The Allgemeine Elektricitäts-Gesellschaft several weeks ago issued its annual report, showing equally splendid results. It raised its dividend from 12 to 13 per cent., and reported orders on hand as being nearly as large as last year. From this it appears that the German electrical industry is in a very favorable position. The stock market takes that view and has bid up electrical shares very strongly within a month.

Buffalo.

BUFFALO, N. Y., December 7, 1909.

Pig Iron.—Buying has slackened, there being little inquiry during the week, except for small lots; but furnaces are receiving shipping directions for extraordinarily heavy tonnages on contracts. Although there is a cessation in large buying, a very observable element of reserve strength is shown in the price situation for all lines, furnaces being to all intents and purposes sold up for their total make between now and July 1. The aggregate stock on furnace banks has also been heavily reduced the last month, placing producers in a very independent position. Notwithstanding this fact, prices are still held on a conservative basis. Among other recent business from territory not strictly tributary to this market considerable pipe iron is going into the Middle West. We quote for remainder of year and first quarter, f.o.b. Buffalo, as follows:

No. 1 X foundry	$17.25 to $17.75
No. 2 X foundry	17.00 to 17.50
No. 2 plain	16.75 to 17.25
No. 3 foundry	16.50 to 16.75
Gray forge	16.25 to 16.50
Malleable	17.50 to 18.00
Bessemer	19.25 to 19.75
Basic	18.25 to 18.75
Charcoal	20.25 to 21.00

Finished Iron and Steel.—Some sales agencies report a slackening in the receipt of new orders for finished steel products, placement being restricted by the inability of mills to take on more business except for extended deliveries. The agency of the leading interest, however, reports that contracts for new tonnage are being made in good volume, exercising a selection of the business offered. The same interest reports that actual orders and specifications on contracts for this agency for the first week of December aggregate twice the tonnage booked for the corresponding week in November. All interests report that specifications on contracts are heavy, dut to the fact that customers have been notified by the mills that any tonnage remaining unspecified at the end of this month on contracts expiring December 31 will be canceled. In black and galvanized sheets the demand is active and new orders and specifications against contracts have been heavy. There is also continued activity in structural lines. Specifications will be out on Saturday of this week for 500 tons of steel required for the Statler Hotel annex, Buffalo, and figures will be received this week for 350 tons for the new machine shop of the Buffalo Foundry & Machine Company, and next week for 350 tons for the Buffalo Glass Company's warehouse. Bids will be asked for in about two weeks for 500 tons of structural material for the new plant of the Buffalo Brewing Company. Local architects are preparing plans for a nine-story and basement 216-room hotel, to be erected at Utica, N. Y., and for a 10-story hotel at Peoria, Ill., both of which will require a considerable tonnage of steel. Contract for steel for the

Lyndehaven Apartment House, Buffalo, about 120 tons, has been awarded to Chas. F. Ernst Sons Iron Works, and for the Thermal Research Laboratory, to be erected by the American Radiator Company, Buffalo, 100 tons, to the George Kellogg Structural Company. The H. C. Harrower Iron Works has secured contract for the Gutman & Co. warehouse, 150 tons. Contract for the steel for the Gleason Works addition, Rochester, N. Y., 300 tons, was awarded to the Groton Bridge Company, Groton, N. Y. The Lackawanna Steel Company is to furnish the 9500 tons of steel required for the Whitehall Building addition, New York City, the fabrication to be done by the Brown-Ketcham Iron Works, Indianapolis.

Old Material.—The market remains dull and inactive, such sales as have been made during the week being principally small lots covering immediate or special requirements. No trading of importance is anticipated prior to the first of the year. Prices are a trifle lower for railroads and machinery cast scrap and for wrought iron and soft steel turnings and cast iron borings, other lines being about the same as last week. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$16.50 to $17.00
Low phosphorus steel	21.00 to 22.00
No. 1 railroad wrought	18.00 to 18.50
No. 1 railroad and machinery cast scrap	16.50 to 17.00
Old steel axles	20.50 to 21.00
Old iron axles	26.00 to 26.50
Old car wheels	17.50 to 18.00
Railroad malleable	17.00 to 17.50
Boiler plate	14.50 to 15.00
Locomotive grate bars	13.00 to 13.50
Pipe	14.00 to 14.50
Wrought iron and soft steel turnings	11.00 to 11.50
Clean cast iron borings	9.00 to 9.50
No. 1 busheling scrap	14.00 to 14.50

Philadelphia.

PHILADELPHIA, PA., December 7, 1909.

The heavy buying movement in basic pig iron has been concluded and the market generally has settled down and will probably continue rather quiet until after the turn of the year. No weakness in prices has developed in any grade. While there have been fewer orders for large quantities of finished materials, specifications are coming in quite freely, and the aggregate volume of business in the majority of lines holds up remarkably well. Makers of plates, shapes and semifinished rolled products produced heavily during November, and, while in some cases the output for the previous month was not exceeded, records made in former prosperous years have, in almost every case, been exceeded. A diminution in new business, as is usually the custom, is expected in the closing month of the year. The market, however, has fully maintained its strength and no weakness is anticipated in any line, as sellers are for the greater part well supplied with orders. Coke is hardly as strong as it was, and somewhat lower quotations are noted both for furnace and foundry grades. The old material market is quiet, with prices lower for some grades.

Pig Iron.—The market on the whole is quiet. Prices, however, continue strong and show no indication of weakening. The recent heavy purchases of basic iron have pretty fully covered the requirements of the majority of the Eastern mills during early 1910. In some cases consumers have purchased practically all they believe they will need during the entire first half, and while there will, no doubt, be some irregular demand, no heavy movement is looked for in the near future. In this connection it is well to note that not only have consumers pretty well covered for their early 1910 requirements, but that producers are also well sold up, and, in the greater number of instances, capacities, at least during the first quarter, have been fully engaged. Prices for basic iron show no change; purchases could still be made for first half shipment at $18.75, delivered, although some sellers still maintain firmly their recent quotations of $19. Low phosphorus iron is still being inquired for; the only transaction reported, however, was one of 3000 tons for early 1910 shipment, at $22, f.o.b. Eastern furnace. The foundry iron situation is unchanged. The larger consumers have taken practically all they want for present and early next year's needs and show no disposition to enter the market for more extended delivery at this time. In a few instances the market has been tested in a moderate way for third quarter and last half deliveries, but sellers have not as a rule considered these inquiries seriously. The bulk of the transactions during the week have been of the prompt carload lot class, with occasional sales of 100 tons or more, for delivery during the early months of next year. Prices are practically unchanged, although sellers who have been holding at $19.50, delivered, for No. 2 X foundry, a price generally admitted to be the extreme top of the market, and who have been taking but a limited amount of business at that basis, have receded to $19.25, which represents the figure at which a majority of the sellers have done business for some time. In a number of cases, however, $19, delivered, can still be done for No. 2 X, dependent on quantity, delivery and shipping point. Low grade foundry irons do not appear to be in as brisk demand, although one transaction of 1000 tons, sold to a cast iron pipe foundry, is announced. The Virginia foundry iron market has been quiet; transactions have been confined to odd lots for early delivery, prices being unchanged at $16, at furnace, for No. 2 X, equal to $19 to $19.25 delivered in this territory. No business has been reported in Southern iron. Foreign foundry iron does not appear to be seriously considered by melters in this district, although charters for several cargoes, to be brought in by merchants against previous purchases, are reported to have been executed. A lot of about 1500 tons which has been on the dock here has been reported sold at a figure representing a loss to the importer. Very little movement in forge iron is noted. Puddling mills appear to be pretty well supplied, while producers have little iron to offer for early delivery. The leading producers are holding firmly at $17.50, at furnace, equal to $17.75 to $18.25, delivered, dependent on destination. Quotations for delivery in buyers' yards, eastern Pennsylvania and nearby points, either for prompt or first quarter shipment, range as follows:

Eastern Pennsylvania, No. 2 X foundry	$19.00 to $19.25
Eastern Pennsylvania, No. 2 plain	18.50 to 18.75
Virginia, No. 2 X foundry	19.00 to 19.25
Virginia, No. 2 plain	18.50 to 19.00
Gray forge	17.75 to 18.25
Basic	18.75
Low phosphorus	22.75 to 23.25

Ferromanganese.—The local market is extremely quiet, no inquiry of any importance being reported during the week. One sale of about 1000 tons, for Western shipment, in the last half of next year, is reported at $44.75, Baltimore. In the absence of business in this vicinity prices are nominally quoted at $45 to $46, Baltimore, for next year's delivery.

Billets.—A fairly active demand for both forging and rolling billets is reported. Western consumers continue making inquiries, against which some good sales for first quarter delivery have been made. Mills in this territory are running at top capacity, previous records being generally broken. Ordinary rolling steel for first quarter shipment is firm at $30.60, delivered here, with forging billets quoted at $32 to $34, Eastern mill, the customary extras applying for high carbons and specal sizes. Billets for prompt shipment still command a premium.

Plates.—While there have been fewer orders of large size coming out, specifications have been numerous, and the aggregate business coming to the mills is large. Production at the leading mills, while not larger in November than in the previous month, averages, as a rule, above the former record output in 1907. Considerable tonnage is in sight, particulalrly from car builders and structural material fabricators, and the trade looks forward to continued activity the coming year. Prices are firmly maintained, ordinary plates, for delivery in this territory, ranging from 1.75c. to 1.80c. for early shipment; for extended deliveries, however, premiums are obtained, although few sellers are willing to accept such business.

Structural Material.—Transactions have been largely confined to propositions of a small and miscellaneous character, although several of fair size are under consideration. Bids for the structural work for a hotel in Reading, Pa., and for the substructure for a new pier in this city are to be opened shortly, while several other good sized contracts are pending. Eastern mills are fully engaged, and have been unable to catch up on delayed deliveries. Prices for plain shapes are firmly maintained at 1.75c. to 1.80c., delivered in this territory.

Sheets.—Makers in this district are operating mills at full capacity with order books in very satisfactory shape, and sellers are frequently unable to take all the business offered. Orders are now being taken for delivery up to February 1, but the extended deliveries go largely to regular customers. Prices are firm at the recent advance, prompt shipmens, however, commanding a premium. For delivery extending up to the end of January the following range of prices is quoted. Nos. 18 to 20, 2.70c.; Nos. 22 to 24, 2.80c.; Nos. 25 and 26, 2.90c.; No. 27, 3c.; No. 28, 3.10c.

Bars.—New business is not quite so active, although the tone of the market continues strong. Specifications on old orders are coming out freely and mills are well engaged, a number having sufficient business on their books to keep them occupied well into January. Steel bars for prompt shipment are still very scarce. Leading producers of refined iron bars maintain prices firmly, quotations for delivery in this territory ranging from 1.65c. to 1.75c., dependent upon customer, tonnage and specification. Mills rolling a small range of sizes, however, frequently shade these figures slightly. Steel bars are firm, at 1.65c. to 1.70c., delivered in this vicinity.

Coke.—Orders have not come out at the recent high range of prices, and producers have, in a number of cases, made somewhat lower quotations both for furnace and foundry grades. Furnace coke for delivery next year is understood to have sold at $2.80 per net ton, at oven, and lower quotations have been made, dependent on quality. Foundry coke for first half of 1910 delivery can be had

freely at $3.25, at oven, and this price has also been shaded. Buyers do not take hold freely, however, there being a disposition to purchase small lots for early delivery rather than to make contracts. For delivery in this territory the first half of next year the following range of prices is named:

Connellsville furnace coke	$5.00 to $5.10
Foundry coke	5.40 to 5.50
Mountain furnace coke	4.55 to 4.65
Foundry coke	4.90 to 5.10

Old Material.—The market is quiet, with prices showing a sagging tendency. New developments are to be noted in the heavy melting steel situation. The associated mills have during the past 30 days been quietly buying considerable scrap, both foreign and domestic, the aggregate amount being reported over 100,000 tons. Being pretty fully supplied, a new basis of making purchases has been announced. The $18 (delivered) price has been maintained, but a freight allowance, representing the rate from the point of shipment to the most distant associated mill, is claimed, even though the delivery point may be to a nearby mill. This virtually means an average reduction of the price, equal to about 50c. a ton. The trade is watching with interest the outcome of this new basis of purchasing. Rolling mill scrap shows continued weakness, owing to heavy offerings. Machinery cast is probably the only strong grade on the list. Transactions, as a rule, have been light, in some grades not enough business having been done to establish a quotation. The following range of prices, while to some extent nominal, is named for prompt deliveries in buyers' yards in this territory:

No. 1 steel scrap and crops	$17.50 to $18.00
Old steel rails, rerolling	18.50 to 19.00
Low phosphorus	23.00 to 23.50
Old steel axles	24.00 to 25.00
Old iron axles	30.00 to 31.00
Old iron rails	20.50 to 21.50
Old car wheels	17.50 to 18.00
Choice No. 1 R. R. wrought	19.50 to 20.00
Machinery cast	17.50 to 18.00
Railroad malleable	17.50 to 18.00
Wrought iron pipe	16.50 to 17.00
No. 1 forge fire scrap	16.50 to 17.00
No. 2 light iron	10.75 to 11.25
Wrought turnings	14.00 to 14.50
Stove plate	13.25 to 14.25
Cast borings	12.00 to 12.50
Grate bars	14.50 to 15.00

J. Ernest Allen, who up to October 1 had, for nine years, been connected with the E. B. Leaf Company and its predecessor, E. B. Leaf & Co., Philadelphia, Pa., has become associated with the iron and steel firm of Potts & Witteman, North American Building, in the same city.

Cincinnati.

CINCINNATI, OHIO, December 8, 1909.—(*By Telegraph.*)

In finished lines none but the best reports come from central territory. All mills are running full capacity, those making sheets particularly. A generally optimistic feeling prevails for next year. Several new open hearth furnace additions are under way, four at Middletown and one at Covington. All jobbers report warehouse conditions admirable. Among larger scrap dealers there is a feeling that with some concessions which they are willing to make at this time there will be some early buying on the part of mills for next year's requirements. Machine tool builders are preparing for a specially interesting meeting and conference at the quarterly dinner here on the 15th, and because of the many matters having a bearing on the distribution of their product at this time, it will have the largest attendance in the history of the local Metal Trades branch.

Pig Iron.—There is a better feeling in the trade than last week and some inquiries are noted, indicating that sparring for next year's requirements has begun. The largest pipe interest is considering to buy through its central buyer some offers and is also making some for next year's supplies. Although Southern No. 2 foundry is quotable at $14.50, Birmingham, there is reason to believe that $14 is being done on prompt shipment iron. There is still considerable speculative iron available, and this is not bringing over the figures named for shipment through the remainder of the month. A representative of one of the largest Southern interests here states that Alabama will produce 180,000 tons this month against 176,000 tons in November. This authority says the Birmingham District is very optimistic on next year's prices and business, and is confidently figuring on sales of 250,000 tons in January. Furnaces running on foundry iron are producing the higher grades. The last sale of forge here brought $13.50, Birmingham. Sales of foundry are running from single carloads to 300 tons and shipments are going mostly into Indiana and Illinois. The largest inquiry in this market to-day is from Chicago territory and calls for basic, 3000 to 5000 tons, for next year. A Michigan melter bought 500 tons of high silicon for early delivery at the market price. An inquiry from Chicago, Michigan territory, asks for prices on 750 tons of malleable for first quarter. This will probably come from Toledo or Detroit, and the price will be between $18 and $19, delivered. The best that furnaces in the Ironton and central Ohio districts could do on this would make the delivered price about $19.80. Some ferrosilicon has been sold recently at about $16, New York. Charcoal irons are still quotable at $22, Birmingham. There seems to be very little Northern resale iron and agents report that furnacemen are very independent in attitude, spot iron selling at $17 at furnace, with some holding for $17.50, which is the price for the first half. There were no bidders reported for the property of the Bird Furnace Company at Ironton on the 4th inst. Few hold-ups are reported in either district, and the improved shipping conditions which insure iron into this market in three days from Birmingham, two days from Dayton, Tenn., and nearer districts in hours instead of days, are regarded as important factors at this juncture in holding down prices under rapidly improving consumption conditions. For December delivery, based on freight rates of $3.25 for Birmingham and $1.20 from Ironton, we quote as follows:

Southern coke, No. 1 foundry	$18.25
Southern coke, No. 2 foundry	17.75
Southern coke, No. 3 foundry	17.25
Southern coke, No. 4 foundry	16.75
Southern coke, No. 1 soft	18.25
Southern coke, No. 2 soft	17.75
Southern gray forge	16.50
Southern mottled	16.25
Ohio silvery, 8 per cent. silicon	20.20
Lake Superior coke, No. 1	$18.70 to 19.20
Lake Superior coke, No. 2	18.20 to 18.70
Lake Superior coke, No. 3	17.70 to 18.20
Standard Southern car wheel	24.75 to 25.25
Lake Superior car wheel	21.75 to 22.25

(*By Mail.*)

Coke.—The first evidences of weakening in the coke market are discernible here to-day, but this does not apply to all districts. It is estimated that an accumulation of some 6000 tons in Wise County is being put up to consuming furnace interests, and this is being offered at prices ranging from $1.90 to $2.10 per net ton, at oven, for spot delivery. Prices on forward delivery are not obtainable. Wise County foundry grades are obtainable at $3 to $3.10 for spot, and the contract prices range from $3 to $3.50. Connellsville furnace coke is a trifle weak and the spot price ranges from $2.80 to $2.90 per net ton, at oven; the contract price is $2.80 to $3. Connellsville foundry is obtainable at about $3.15 to $3.25 for spot shipment and for forward delivery $3.30 to $3.50. The shutting down temporarily of a Georgia furnace for repairs has, it is understood, thrown some furnace grades on the market. Pocahontas furnace coke is obtainable at prices ranging from $2.50 to $2.75, according to grades and deliveries, and on contract $2.60 to $2.75 is asked. Pocahontas foundry is quotable at $2.75 to $2.85 for spot and on contract $2.85 to $3.

Shapes, Plates and Sheets.—In these lines the local market from a jobbing viewpoint has suffered no diminution. Shapes and plates are bringing 2c. out of the yard and the demand is good. There is nothing big to figure on in this market until the plans are ready for the new county jail. One or two of the independent interests, it is understood, have sold for delivery as far ahead as July 1 at 1.60c., but apparently none is now willing to contract at this price. On sheets the demand continues excellent and some good premiums are being paid mills in this section for immediate delivery. On material for ordinary deliveries the prices obtained are those quoted in the Pittsburgh market plus the freight rate, 15c.

Bars.—Business in steel bars continues good, especially sales from warehouse, and dealers are getting 1.90c. for this class of business. Mills do not seem inclined to contract for forward delivery, and ask that any offered business be taken up with the home offices before acceptance. Little is heard of anything less than 1.60c., Pittsburgh, for delivery subject to conditions at mills. Iron bars are a little weak, but warehouse business continues good, while 1.60c., Cincinnati, is asked, 1.55c. has been done.

Old Material.—The market is very weak, and there are practically no transactions upon which to base prices. Dealers are still buying, one large dealer taking 5000 tons today from a prominent railroad. Some of these latter interests are cleaning up their yards without the formality of sending out requests for bids, and dealers are taking such offerings as a rule at prices satisfactory to the roads. None of the mills in this section is in the market for anything. Dealers are confident of a busy January, but are not expecting anything to develop before the holidays. In the absence of transactions the following prices are given as the nearest obtainable and are f.o.b. Cincinnati:

No. 1 R. R. wrought, net ton	$14.00 to $14.50
Cast borings, net ton	8.00 to 8.50
Heavy melting steel scrap, gross ton	15.00 to 16.00
Steel turnings, net ton	9.00 to 10.00
No. 1 cast scrap, net ton	13.50 to 14.00
Burnt scrap, net ton	10.00 to 10.50
Old iron axles, net ton	18.50 to 19.00
Old iron rails, gross ton	18.00 to 18.50
Old steel rails, short, gross ton	15.00 to 15.50
Old steel rails, long, gross ton	16.00 to 16.50
Relaying rails, 56 lb. and up, gross ton	22.00 to 22.50
Old car wheels, gross ton	15.50 to 16.00
Low phosphorus scrap, gross ton	17.50 to 18.00

Metal Market.

NEW YORK, December 8, 1909.

THE WEEK'S PRICES.

Cents per Pound.

	Copper.			Lead.		Spelter.	
Dec.	Lake.	Electrolytic.	Tin.	New York.	St. Louis.	New York.	St. Louis.
2	13.75	13.25	31.70	4.40	4.27½	6.40	6.25
3	13.62½	13.12½	....	4.40	4.27½	6.40	6.25
4	13.62½	13.12½	31.60	4.40	4.27½	6.40	6.25
6	13.75	13.37½	31.85	4.40	4.30	6.37½	6.20
7	13.75	13.37½	31.85	4.40	4.30	6.37½	6.20
8	13.75	13.37½	32.25	4.40	4.30	6.37½	6.20

Copper.—The copper situation is interesting, regardless of the fact that the sales during the last three days have been decidedly small and the prices quoted at present are more or less nominal. With the prospects of an abandonment or postponement of the proposed amalgamation of copper producers the trade is turning its attention toward the statistical situation, and it is certain that the forthcoming report of the Copper Producers' Association December 10 will have an important effect on the market. That some producers are apprehensive over the situation is evident, as it is reported in reliable quarters that overtures have been made toward arranging a curtailment in production. This action may be taken by the large producers instead of carrying out the proposed combination plans. If the copper production continues heavy the immediate future is uncertain, as it is apparent that during the recent flurry many consumers who were unable to get February and March copper, or had not enough faith in the situation to pay the price asked, gave heavy orders for January delivery. In consequence next month will see unusual large deliveries of copper, much of which will not go into consumption until February, March and even April. Casting copper has again become decidedly scarce and some people are holding it at the same price as electrolytic, which is 13.37½c. Casting copper, however, can be bought for 13.25c. Lake copper is firm at 13.75c. Regarding the price of electrolytic, it should be added that sales were reported today at 13.25c., but these were in outside lots sold by people who had picked up too much copper during the recent buying movement. All things considered, the position of electrolytic is not as firm as lake. London reports business dull, and it is very apparent that the consumers are not taking up much of the copper being sold there at present. To-day in the London market spot copper was sold for £59 and futures for £60 2s. 6d. The sales amounted to 500 tons of spot and 900 tons of futures. The market was easy.

Pig Tin.—A more thorough study of the November statistics regarding pig has created a strong undercurrent of optimism and the principal sellers have great faith in the situation. At no time in October was pig tin sold below the cost of importation and the market has gradually strengthened in the last two weeks. Taking into consideration the fact that the stocks on the first of this month amounted to 2335 tons, and that the arrivals so far this month have been 915 tons, while 2100 tons are reported afloat, of which 1600 tons are on steamers unknown, the supply of tin that will be on hand at the end of this month may very probably be exceedingly small. From all accounts the biggest part of the 1600 tons of tin on steamers unknown will not arrive during the month. This leaves 3750 tons in sight for the end of the month. In October 4100 tons of tin went into consumption and in November 4000 tons, so it can be seen that unless a great deal more tin than is estimated comes in or the consumption is greatly curtailed there will be but little tin on hand the first of the year. During the week the buying was steady and prices were firm. The market was very good to-day and spot tin was sold for 32.25c. The London people seem to take the same view of the situation as the principal sellers, here, as spot tin advanced sharply there to-day. This morning spot tin was sold for £146 5s. and futures for £148, which was £2 higher than the market price of yesterday. This afternoon spot tin was sold in the London market for £146 and futures for £147 15s. The sales amounted to 250 tons of spot and 600 tons of futures. The recession in price was due to a speculative bear movement.

Tin Plates.—A feature of the tin plate market is the fact that there have been remarkably large sales of Swansea plates here. The price of plates advanced 3d. in the London market to-day, making the price 12s. 6d. It is not thought that any of this tin is going into domestic consumption, as the canners are taking most of it and they, of course, re-export it as cans. The domestic situation is unchanged; the mills are running to full capacity and cannot make deliveries under three months. Substantial premiums are still being asked by some makers, but the leading interest continues to make its price for 100 lb. I C coke plates, $3.84.

Lead.—Lead is firmer and outside interests have advanced their price to 4.42½c., New York. The American Smelting & Refining Company continues to quote 4.40c., however, and will sell all that is wanted. In St. Louis the independents control the market, and they are underselling the American Smelting & Refining Company. The latter company is asking 4.32½c. there, while the independents are asking 4.30c. Accordingly we are quoting the latter price in that market. The demand is good, but not heavy.

Spelter.—Although it is thought that the greater amount of the stocks of spelter are in the hands of a few parties who have an understanding, the market has weakened because of a lessened demand. The manufacturers of galvanized products are not buying as heavily as they were a week or two ago, and it is certain that concessions are quietly being made to buyers. Deliveries for next year have been offered at under the spot market and this has weakened the situation somewhat. We quote Western spelter at 6.37½c., New York, and 6.20c., St. Louis.

Antimony.—More interest has been taken in antimony during the week and some fair sized sales are reported. In several cases small consumers ordered for the entire year 1910 and a number of orders were placed covering the first half of the year. It is freely predicted that antimony will advance, although Hallett's can still be had at 8.12½c. and Cookson's at 8.37½c. Other brands have gone up to 7.87½c. From all accounts antimony is a good buy just now.

Old Metals.—The market is inclined to weakness. Following are dealers' selling prices:

	Cents.
Copper, heavy cut and crucible	13.00 to 13.25
Copper, heavy and wire	12.50 to 12.75
Copper, light and bottoms	11.75 to 12.00
Brass, heavy	9.25 to 9.50
Brass, light	7.75 to 8.00
Heavy machine composition	12.25 to 12.50
Clean brass turnings	8.75 to 9.00
Composition turnings	10.25 to 10.50
Lead, heavy	4.20 to 4.25
Lead, tea	3.90 to 3.95
Zinc scrap	5.00 to 5.25

New York.

NEW YORK, December 8, 1909.

Pig Iron.—Foundries in Eastern territory are evidently quite well supplied with iron for the next few weeks—better, it would appear, than districts farther west. A New Jersey inquiry for 3000 tons for the second quarter of 1910 is the largest business that has come up locally. Some inquiries have been made for iron for the second half of 1910, but some producers are unwilling to quote, while others ask from 50c. to 75c. more than for the first half. In some cases furnaces are shipping in excess of their current make; in others, stocks are at a stand. The difficulty of disposing of lots from a cargo of Middlesbrough iron recently imported indicates that competition from that direction is not likely to be a factor, on the present level of prices for domestic iron. We quote New York prices as follows, for early delivery: Northern No. 1 foundry, $19 to $19.50; No. 2 X foundry, $18.50 to $19; No. 2 plain, $18.25 to $18.50.

Steel Rails.—The Harriman lines have bought 25,000 tons additional for 1910, placed with the leading interest. The Alabama mill has sold 3000 tons to the Georgia Railroad and 1600 tons to the New Orleans & Northeastern. The Delaware & Eastern is asking for 12,000 tons, deliveries beginning in April. The Mexican Northern is in the market for 8000 tons.

Ferroalloys.—Ferromanganese has weakened and it is freely offered at $45.50. The parties reported two weeks ago as being in the market for large quantities have been supplied and it is possible that they paid the price we quote. Ferrosilicon is very quiet; it can be had for $62.50.

Structural Material.—A rush to get in all specifications on contracts which expire with the end of the year has the mills so well occupied that there is little quest for new business. The fabricators have closed some nice orders during the week and there are several large prospects ahead. Bids have been advertised for December 20 on the new municipal building, which will be 25 stories high and require somewhere between 18,000 and 25,000 tons. Bids have also been invited for the rebuilding of the Quebec Bridge, but it is of little interest to the fabricators this side of the border on account of the high duty. It is probable that the original contractor will bid, however, and possibly one other, but it may be that the forgings and plain material will be all that this country will get, as Canada has its own facilities for drilling, punching and riveting. Without any very definite information as to what design may be bid upon, it is estimated that from 50,000 to 60,000 tons will be required. The Interborough Rapid Transit Company opened bids December 6 on about 500 tons for elevators and station improvements; the contract was awarded to the American Bridge Company. The same company is to fabricate some 2000 tons for the Tennessee Coal, Iron & Railroad Company, including 1600 tons for an open hearth plant at Ensley, Ala., and 5000 tons of steel for the American Steel & Wire Company's new wire mills at the same place. It will not be known for a month at least how much will be required for the new sheet and tin plate mills and axle shop at Gary, but probably not less than 25,000 tons of structural material. The St. Paul Railroad placed orders for about 1700 tons, of which 1200 tons went to the Minneapolis Steel & Machinery Company and the remainder was divided between the Lackawanna Steel Company and the Chicago Bridge & Iron Com-

pany. The Delaware & Eastern is said to be on the market for about 4000 tons. Bids are now being taken for the Vine street wharf in Philadelphia, initially for 1000 tons, with 2000 tons more to be let probably some time in the spring. The Department of Docks and Ferries in this city is said to be inquiring for a moderate quantity for a pier shed at Thirty-third street in Brooklyn. A leading independent mill has closed orders for about 1000 tons of plain material for three loft buildings in this city, two of the contracts for which have been taken by Levering & Garrigues and one by the Hinckel Iron Company. Two of the buildings are owned by the Feldt Construction Company and the other by F. C. Gobel. The Bethlehem Steel Company is promising deliveries complete on fair sized lots for buildings in 8 to 10 weeks. Prices remain unchanged at 1.76c., New York, on mill shipments on plain material; material out of stock, 2c. to 2¼c.

Plates.—So far no others have joined the one mill that advanced prices last week for the first quarter of 1910, and 1.76c., tidewater, is still quoted as base on regular deliveries. The contract has not yet been awarded on the seven 9½-ft. siphons, bids on which were opened by the Board of Water Supply December 2. The Snare & Triest Company was low bidder, and the quantity of plates to be required, 6300 tons. Another award at present held up is on some lock-bar pipe work for Brooklyn, which will require about 2000 tons of plates. The lowest bid was submitted by the Harlem Construction Company. A good run of business in small lots continues, and deliveries range from 10 days to two or three weeks.

Bars.—Between the increased demand for iron bars occasioned by the difficulty of getting prompt deliveries of steel bars, and the recent advance in wages for certain trades, increasing the labor cost, the bar iron producers are likely to raise prices shortly. At present, however, they are still 1.70c. to 1.75c. for ordinary refined iron, and 1.75c. to 1.80c. for test bars in carload lots, tidewater. Steel bars are firm at 1.66c., New York.

Cast Iron Pipe.—The reletting of the Brooklyn Water Works extension last week was without result. Under the threat of an injunction from one of the low bidders at the previous letting, the new bids were all returned and the matter is therefore hung up to await some decision regarding the proper course to pursue by the city officials. General trade is now seasonably quiet, except that good inquiries continue to be received for water and gas pipe for delivery next year. Foundries are all in very much better condition as to work on hand than they were at this time last year. Carload lots of 6 in. are quoted at $26 per net ton, tidewater.

Old Material.—Foundry stock continues to be almost the only class of scrap in anything like a fair demand. Prices of all materials coming under this classification are well held. The rolling mills are doing little, as their inventory season is at hand and mill owners naturally desire to have as low stocks as possible. The heavy steel scrap trade is in exceedingly unsatisfactory shape from the standpoint of the dealers. A new arrangement is being introduced by the purchasing agency for the associated eastern Pennsylvania steel companies, which carries with it such uncertainty that until the plan has been thoroughly figured out the dealers will do practically nothing in making fresh purchases. The plan is set forth in the Philadelphia market report, which appears on a previous page. Considerable foreign scrap continues to be offered in this locality. Quotations are as follows, per gross ton, New York and vicinity:

Rerolling rails	$15.50 to $16.00
Old girder and T rails for melting	14.50 to 15.00
Heavy melting steel scrap	14.50 to 15.00
Relaying rails	20.50 to 21.00
Standard hammered iron car axles	23.50 to 24.00
Old steel car axles	20.50 to 21.00
No. 1 railroad wrought	16.50 to 17.00
Wrought iron track scrap	15.50 to 16.00
No. 1 yard wrought, long	15.50 to 16.00
No. 1 yard wrought, short	15.00 to 15.50
Light iron	9.50 to 10.00
Cast borings	9.50 to 10.00
Wrought turnings	11.00 to 11.50
Wrought pipe	13.75 to 14.25
Old car wheels	16.00 to 16.50
No. 1 heavy cast, broken up	15.50 to 16.00
Stove plate	13.00 to 13.50
Locomotive grate bars	12.50 to 13.00
Malleable cast	17.00 to 17.50

Iron and Industrial Stocks.

NEW YORK, December 8, 1909.

Washington news is now exerting an appreciable influence on operations in the stock market. Great buoyancy was observed on Saturday, when reports were circulated that President Taft would treat business subjects conservatively, but on Monday, when rumors of a different character came to hand, the gains which had been made were rapidly lost. In the main, prices of iron and industrial stocks have been steady, but quite a spurt occurred in National Enameling & Stamping common, which touched 27⅝ on Tuesday. The range on active securities in this line has been as follows from Thursday of last week to Tuesday of this week:

Allis-Chalm., com.	15 - 15¾	Railway Spr., pref.	108½
Allis-Chalm., pref.	54 - 55¼	Republic, com.	45¼ - 46⅞
Beth. Steel, com.	33½ - 35	Republic, pref.	105⅝-106½
Beth. Steel, pref.	67½ - 68	South. I. & S., pref.	52
Car, com.	13½ - 14½	Sloss, com.	87½ - 89
Can, pref.	82¾ - 83⅞	Pipe, com.	31½ - 33
Car & Fdry, com.	70½ - 73¼	Pipe, pref.	84½ - 84¾
Steel Foundries	63¼ - 65¼	U. S. Steel, com.	86¾ - 91⅛
Colorado Fuel	49 - 51½	U. S. Steel, pref.	123¾-125
General Electric	158-160¾*	Westinghouse El.	83 - 84⅞
Gr. N. ore cert.	77¾ - 81¾	Va. I., C. & C.	71
Int Harv., com.	107 -108½	Am. Ship, com.	68 - 70
Int. Harv., pref.	124	Am. Ship, pref.	111½
Int. Pump, com.	50½ - 53	Chi. Pneu. Tool	36¼ - 37¾
Int. Pump, pref.	88¾ - 90½	Cambria Steel	46½ - 47¾
Locomotive, com.	59⅞ - 63	Lake Sup. Corp.	25⅞ - 27¼
Locomotive, pref.	114¾-114⅞	Pa. Steel, pref.	115
Nat. En. & St.,com.	22½ - 27⅜	Warwick	11
Nat. En. & St.,pref.	98 - 99½	Crucible St., com.	14⅛ - 14¾
Pressed St., com.	51¼ - 53	Crucible St., pref.	88 - 90
Pressed St., pref.	105 -105½	Harb.-W. Ref., com.	36
Railway Spr., com.	50 - 50⅞	Harb.-W. Ref., pref.	95

* Ex dividend.

Last transactions up to 1.30 p.m. to-day are reported at the following prices: United States Steel common 91⅞, preferred 125¼, bonds 105⅛; Car & Foundry common 73, preferred 119; Locomotive common 61¾, preferred 114; Steel Foundries 65¼; Colorado Fuel 50¾; Pressed Steel common 52¾, preferred 105; Railway Spring common 50⅜; Republic common 46⅞, preferred 106⅜; Sloss-Sheffield common 88; Cast Iron Pipe common 32, preferred 84¾; Can common 14¾, preferred 84½.

A Record in Lake Ore Shipments.

The Season's Total Was 41,684,045 Tons.

Returns to *The Iron Age* from the nine Lake Superior docks show that the shipments of iron ore by water in the season of 1909 were 41,684,045 gross tons, an estimate being made for two small cargoes which were yet to be loaded at Escanaba, Mich., when the figures were made up on December 6. In spite of the accident at Poe lock November shipments were large, reaching 4,899,220 tons, as against 3,700,471 tons in November, 1908. The shipments this month were beyond expectation also, the total being 519,491 tons. In the table below are given the shipments from the various ports for this and the three preceding years, from which it appears that the record of 1907—41,288,755 tons by water—has been exceeded by about 400,000 tons. This is another surprising performance of this remarkable year in the iron industry:

Iron Ore Shipments from Upper Lake Ports.—Gross Tons.

	1909.	1908.	1907.	1906.
Escanaba	5,748,042	3,351,502	5,761,988	5,851,095
Marquette	2,909,578	1,487,487	3,013,826	2,791,033
Ashland	3,834,285	2,513,670	3,437,672	3,388,111
Two Harbors	9,181,132	5,702,237	8,188.906	8,180,128
Superior	6,540,505	3,564,030	7,440,386	6,083,057
Duluth	13,470,503	8,808.168	13,445,977	11,220,218
Total by lake	41,684,045	25,427,094	41,288.755	37,513,642
Total by rail		587,893	975,959	1,052,173
Total shipments		26,014,987	42,266,668	38,565,815

It will not be known until after the close of the calendar year how much should be added to the above total by water in 1909, for shipments made to furnaces by all rail routes from the mines. They would only need to equal those of last year, which were much below the average, to give a grand total in excess of that of 1907. The probabilities are that the all-rail shipments this year will be nearer the average of 1906 and 1907, though in the former year considerable lake ore went to Colorado. All-rail shipments include ore from Minnesota mines to the Duluth furnace, ore sent from the old ranges to the charcoal furnaces in Michigan and Wisconsin, and Wisconsin ore going to the coke furnaces at Spring Valley and Mayville, Wis. South Chicago usually receives some all-rail ore, but has had little this year.

The United States Steel Corporation's water shipments, which were 14,252,911 gross tons last year and 22,553,642 tons in 1907, were around 21,500,000 tons this year, or 1,000,000 tons less than in 1907. Its percentage of the total shipped by water is thus 51.5 for this year, as compared with 56 per cent. last year and 53 per cent. in 1907. The old ranges are holding their own in output and, in fact, have shipped a slightly larger percentage of the total than in 1907.

The Machinery Trade.

NEW YORK, December 8, 1909.

While no big projects have come before the machinery trade during the past week a very satisfactory business has been done in the way of scattered orders. The volume and character of this business indicate that the general manufacturing trade is active as the machinery that is being purchased is largely for increasing manufacturing facilities rather than for new enterprises. A good deal of this trade just now is coming from companies that make a business of repairing railroad locomotives and cars, which indicates that the railroad repair plants are not able to handle all of the needed repairs. The manufacturers of steel passenger and freight cars are also placing orders in the trade but they are doing nothing big in that line as most of them anticipated the demand that would be made on their resources a year or more ago.

One local machinery house reports that it did more business in November than any other month in the year, but every other month in the year larger individual orders were received. In other words, the orders placed in November were scattered and were largely for two or three pieces of machinery. In many ways the business done last month by this house was more profitable as in cases where a large order is being placed the buyer is enabled to make a closer bargain and the competition in such cases is particularly strong. The usual excuse that comes from some at this time of the year, to the effect that they would rather wait until the first of the year to close their orders is being made by some prospective purchasers. It is true, however, that many new enterprises are being held in abeyance until after the holidays.

In addition to the fact that second-hand machine tools are high, they are becoming decidedly scarce and lists of machinery offered for sale by manufacturers who, for one reason or another, wish to dispose of them are eagerly sought by dealers. Milling machines, planers and shapers are especially scarce and some makes are bringing record prices. The bidding at recent receivership sales where machinery has been offered was decidedly spirited and dealers who were successful in obtaining stock congratulated themselves, regardless of the fact that they were obliged to pay considerably more than is usually the rule.

The activity in the copper producing districts which has prevailed throughout the year has increased the demand for mining machinery, and the American Smelting & Refining Company and the Miami Copper Company have been large buyers of late. The latter company has been purchasing for a 2000-ton mill at Globe, Ariz., which includes a large concentrator and power plant. The first unit will have a capacity of 1000 tons and further additions will shortly be made. Other copper interests have been heavy buyers, and there has been renewed activity in the buying of mining machinery for Mexico.

The trade will shortly hear of machinery requirements for the proposed new Manual Training and Commercial High School to be erected at Newark, N. J. The plans for the structure have been completed and sent to the State Board of Architects for their approval, and it is expected that when the board takes favorable action work on the building will be commenced at once, as it is hoped to have the school opened by September, 1911, at the latest. The structure will cost $570,000, and it is proposed to equip a foundry and forge room in the basement and on the first floor there will be a machine shop, pattern shop, woodworking shop and a sheet metal working department. The rest of the building will be taken up by classrooms, a mechanical laboratory, assembly hall, &c. The building will be equipped with an automatic sprinkling arrangement, and a large power plant, pumping equipment, &c., will be needed. The power details will be arranged as soon as the plans for the building are approved and later a list of the machinery requirements will be compiled.

From all indications the Fiat Automobile Company, 1786 Broadway, New York, has not as yet completed its buying for the plant the company is to occupy at Poughkeepsie, N. Y., for the construction of its American cars. It will be remembered that in the summer a list was placed before the trade and some of those who got orders found that the company was not buying to the full extent of the list originally sent out. It was then announced that the list had been curtailed somewhat. The inquiries now out do not indicate whether the buying that is being done is to complete the original list, but it is apparent that the company will place some fair sized orders shortly.

The American Locomotive Company is buying against a small list of machine tools for its automobile plant at Providence, R. I. The equipment that is being asked for is a line of machinery specially adaptable for doing fine work on auto parts and the list calls for an expenditure of nearly $10,000.

A large amount of machinery will be required to replace that destroyed in the plant of the Riley-Klotz Mfg. Company, 17-19 Mulberry street, Newark, N. J., December 6. The company manufactured metal novelties and auto supplies and occupied five floors of a six-story building. It furnished its own power and used a large number of stamping presses and other general machinery equipment. The biggest part of this machinery, including a power plant of about 200 hp., was totally destroyed, and as the company proposes to rebuild as soon as possible this will have to be replaced. The firm is an old established one and until the fire the plant was running to full capacity and was crowded with orders.

The Birmingham Rail & Locomotive Company, Birmingham, Ala., has purchased a site at North Birmingham on which a plant is to be constructed during the early part of next year for the repairing of railroad equipment. This is an enlargement of the company's present operations along that line and the matter of new equipment has not as yet come up. The site the company has purchased is 8 acres in extent and it has been decided to erect steel buildings, but the size of the proposed structures has not been settled upon as yet.

The American Platinum Works, 251-255 New Jersey avenue, Newark, N. J., has purchased a building 110 x 250 ft., adjoining its present plant, which the company expects to reconstruct and modernize and add to its facilities for refining platinum, gold and silver. It will be remembered that mention has been made in this market that the company has been inquiring for equipment.

The American Power & Light Company, 62 Cedar street, New York, has taken over the United Gas Company, the Edison Light & Power Company and the Gas & Appliance Company, all of Wichita, Kan. It is the intention of the company to either enlarge the present power house of the Edison Light & Power Company or to build a new one, but final plans have not been worked out as yet.

The Chesapeake & Ohio Coal & Coke Company, 165 Broadway, New York, requires machinery for a new mining operation near Eccles, W. Va. Some contracts have already been placed and a hoist and compressor are likely to be installed first. The initial plant, it is said, will cost $500,000.

The Garbutt Machine & Foundry Company, Ogdensburg, N. Y., the incorporation of which company was recently noted, has its foundry completed. It is being equipped to handle iron, brass and alloys, and the company intends to add in the future an oxy-acetylene welding plant, a small steel converter and a small but fully equipped machine shop. This company was primarily incorporated to take care of the manufacturing end of the Century Engineering Company, but will also take outside custom work.

The Rome Locomotive & Machine Works, Rome, N. Y., is preparing plans for a repair shop addition, which is to be an 80 x 100 ft. one-story steel frame and brick building. It will be erected next spring.

The New York Central & Hudson River Railroad will receive bids about January 1 for concrete and brick car shops to be erected at Oswego, N. Y., at a cost of $75,000. Power plant equipment will be required.

The Carpenter-Kerlin Gear & Machine Company, 77 White street, New York, has taken over the general agency for the Velox chain blocks, which are made in Germany. These blocks are high speed pulley blocks, made of either steel or wrought iron. The power is transmitted from the hand chain wheel to the load sheave through a double chain of spur gears. The driving pinion, which is keyed to the hand chain wheel, meshes with two gears, which in turn engage in the fixed internal gear, the gear box being rigidly fastened to the load sheave. This double counterbalanced gear insures safety and smooth running. The chains are made in standard sizes up to 5 tons capacity.

The C. B. Nicholson Company, 90 West street, New York, has taken the American selling agency for Owassa Bakelite pump valves, valve disks, &c.

The Morse Thermo-Gage Company, Trumansburg, N. Y., has moved its office and laboratory to 208 East State street, Ithaca, N. Y., and requests that all mail be sent to the new address.

The Bethlehem Steel Company, South Bethlehem, Pa., has about completed the letting of contracts for the extension of its machine shop facilities, in the shape of additional shops and equipment, amounting to over $500,000. This extension is primarily to round up the manufacture of heavy power machinery, such as gas engines and pumping machinery of all classes, as well as special lines of machinery, such as hydraulic forging presses, &c.

Chicago Machinery Market.

CHICAGO, ILL., December 7, 1909.

November, on the whole, was a very satisfactory month in the Chicago machinery market. It has been expected that December would prove a quiet month, owing to the approach of the holidays and the fact that many buyers make their fiscal year coincide with the calendar year and

therefore are not disposed to undertake new business until after inventory. During the first few days of December, however, many of the houses have had a very satisfactory run of new business, and while trade is quiet in some lines, this is to be expected. The railroads have many orders in the market for boring mills and other car shop machines, and this business counts up rapidly on the books. The Burlington, the Rock Island, the Santa Fé and other Western roads have placed many orders this fall for one or more machines at a time without sending out any general lists of their requirements, and it is expected that a great deal more business along this line will be done after the first of the year to keep pace with the extension of car shop facilities. Along with this railroad buying has come a larger volume of business from machine shop and manufacturing plants, most of it for one or two machines at a time, but making a good volume of business in the course of a month. The chief difficulty is to satisfy buyers regarding deliveries. When the dealers can get machine tools promptly from the factories nobody wants to buy, but when the buyers swarm in the market the business that can be done is limited by the capacity of the shops. Many of the old established manufacturers of machine tools, whose business might be doubled or quadrupled, go on for years without any expansion of their facilities, a fact which often proves embarrassing to the houses which handle their product.

An interesting feature of the machinery trade the past year in Chicago is the application of the oxy-acetylene welding process in repairing broken parts of machinery. This process welds cast iron as readily as steel, and surprising results are shown in welding broken frames and castings. Locomotive frames are welded without being taken down, defective spots in boilers are cut and new plates cut to size and welded in. Cracked engine cylinders are welded where plants would have to shut down except for this method of making quick repairs. A hydraulic press working under 3000 lb. pressure developed soft spots in the cylinder which allowed the water to leak through the spongy iron, but these spots were cut out and good metal welded in. Almost any part of a machine or heavy frame can be repaired in this manner, and the weld seems as strong as the original metal. Very heavy work is sometimes undertaken, but there is a limit beyond which it is not practicable to go at present, due to the fact that the heat is conducted away from the work faster than it can be applied by the torch. This seems to be the chief obstacle encountered in the welding of copper, which conducts heat very rapidly. Small sections of copper are easily handled, but in larger work the process is not so successful. Small sections of aluminum are welded without difficulty, and new discoveries are made from day to day of the uses that can be made of this interesting process.

The H. A. Stocker Machinery Company, Chicago, recently placed a 96-in. King rapid production boring and turning mill with Pyott & Co., machinists, Chicago. The same company also furnished the machine shop equipment for a coal company at Monarch, Wyo.

An announcement given publicity that the Chicago, Burlington & Quincy Railroad has authorized the expenditure of $100,000 for the purchase of electrically operated machine tools and equipment to be installed in its West Burlington shops cannot be confirmed, but the company advises that it is buying considerable new shop equipment from time to time.

Philadelphia Machinery Market.

PHILADELPHIA, PA., December 7, 1909.

From further available data it is to be noted that the majority of machinery merchants in this city experienced a fairly satisfactory month's business during November. The volume taken was not large, but showed that there had been a healthy increase in the demand and that the trade generally was on a more substantial basis. That there should be a falling off in fresh business during the current month would not be unexpected, owing to the fact that purchases are frequently deferred until after the turn of the year; at the same time several merchants have some considerable business under negotiation, a good portion of which they expect to close in the very near future.

Although nothing beyond scattered single tool orders have recently come from the railroads, it is understood that master mechanics at the various car and repair shops are preparing lists of tools. What disposition will be made of the requisitions when finally acted upon by the officials of the different roads is still problematical.

Here and there some talk of further buying by automobile makers is heard, but this business is still in somewhat uncertain shape. The past week has been fairly active: merchants report better sales of tools of the usual standard types, although purchases are still largely of the single tool character. Prices show practically no change, although dealers anticipate an advance in quite a few lines after the turn of the year. Deliveries are steadily hardening and continue to influence sales in some cases.

Machine tool builders find business on the whole to be steadily improving. In some instances there was a little falling off in orders, particularly toward the close of the month, but the general demand continues fairly good and in a number of instances the volume of business coming out shows an increase. Industrial plans of all kinds maintain very active conditions, although there is little new development of anything in the way of extensive betterments now before the trade in this territory.

The demand from abroad shows very little change. In some special lines a few more orders are reported, but business in the standard lines of machine tools is practically neglected.

A moderate demand is reported by second-hand machinery merchants. The hardening deliveries on new tools are helping this branch of the trade to a considerable extent. There is very little betterment to be noted in the demand for second-hand engines, although there is some movement in boilers, particularly those of medium capacities. A better demand for new power equipment is reported; negotiations are understood to be about completed for some heavy installations, while others are under consideration.

The foundry trade is more active; steel casting plants are, as a rule, fully occupied and in a number of cases prompt deliveries are hard to obtain, and in instances advanced prices are being quoted. Gray iron foundries are probably a trifle better engaged; the general demand is larger, although no sharp increase in the demand for machinery castings is to be noted.

The contract for the erection of the buildings for the new silk mills for Camuel Courtauld & Co. at Marcus Hook, near Chester, Pa., which has previously been referred to in these columns, has been awarded to William Provost, Jr., contractor, Chester, Pa., who will begin work at an early date.

Plans have been posted for estimate for a large manufacturing building to be erected for the Lehigh Mfg. Company at Twenty-second street and Lehigh avenue. The proposed building is to be seven stories high and constructed of reinforced concrete and terra cotta, and will have ground plan dimensions of 76 x 144 ft.

Application for a charter under the Pennsylvania laws has been made, it is understood, for the Olds-Oakland Company, which will engage in the manufacture of motors for aeroplanes, automobiles and power boats. The applicants are C. W. Odell, 1208 Walnut street, this city; Charles A. Wigmore, Glenolden, Pa., and F. C. Vanderhoof, Philadelphia. Plans regarding the company are said not to be sufficiently developed to enable any statement to be made.

The Armstrong Truck Company, North Wales, Pa., which until recently had a branch office and repair shop at 411 Cherry street, in this city, has transferred its repair shop to its plant and moved its local sales department to Section U, Bourse Machinery Hall, Bourse Building, where a display of Armstrong patent truck casters and trucks for various purposes will be made. Louis Brandenstein represents the company at its local office.

Plans are being estimated upon for the erection of an ice manufacturing plant for the American Ice Company, to be built at Ninth street and Washington avenue. The building is to be of brick and concrete and will measure 71 ft. 6 in. by 124 ft. on the ground plan.

The Royal Ventilator & Mfg. Company, Philadelphia, Pa., will increase its capital stock to $100,000 in order to enable it to take care of steadily increasing business. The company proposes to materially enlarge its present plant in the above city, and will also establish a branch plant in the Middle West in order to take care of its trade in that territory. Some equipment in the way of machinery and tools will be required, but at the present time details regarding this have not yet been decided upon.

Separate sealed proposals will be received by John L. West, steward of the State Hospital for the Insane of the Southeastern District of Pennsylvania, Norristown, Pa., until December 29, for one air compressor, one engine, one dynamo and a motor, generator and switchboard.

Cleveland Machinery Market.

CLEVELAND, OHIO, December 7, 1909.

The demand on local merchants for machine tools continues steady and active. The buying is quite general, but orders are mostly for small lots of tools. The tools for which there is the greatest demand are lathes and milling machines in medium sizes. The best source of business at present appears to be from makers of automobile parts, many of whom are increasing the capacity of their plants. Many of these plants have enough work under contract or in sight to keep them running with an output greater than their present capacity during the next few months. In other metal working lines many companies are planning plant ex-

tensions during the winter or early spring. The general demand for machine tools is usually less active during December than during the months immediately preceding, many buyers awaiting until after the annual meetings of their companies at the first of the year before placing orders for new machinery. In view of the delayed deliveries on many of the standard tools, however, it is believed that in many cases manufacturers who expect to add to their equipment will not wait until the new year to make their purchases. This is indicated by the volume of business that is coming out this month. The demand on machinery houses for supplies is very active, a large volume of orders being placed by the railroad companies.

The demand for small and medium sized motors is very good and local makers have all the orders they can fill. Some makers of motors are now considerably behind on deliveries.

Local machine tool manufacturers report a good volume of orders, and other manufacturing plants in metal working lines are nearly all running at their maximum capacity. The demand for brass castings is very good and local foundries engaged in making these castings have about all they can do. The demand for iron castings continues good.

The demand for second-hand machinery, which has been good for some time, has become comparatively light. In most cases buyers want new tools.

The rubber industry in Akron is in a very prosperous condition and a number of the plants, some of which have built large extensions during the past year or two, are planning further enlargements during the next few months. Some of these projects have not yet assumed definite shape, but are expected to be acted upon at annual meetings of the companies to be held soon after the first of the year. The planned extensions are largely for the purpose of increasing the output of automobile tires. These plants use considerable special machinery in the manufacture of their products and maintain repair shops. Taken altogether, the machinery houses get considerable business from this source. The purchase of standard tools by the rubber manufacturers include boring mills, lathes, drill presses and planers. Among the new construction work projected by the Akron rubber companies is the following: The Diamond Rubber Company has broken ground for a five-story building, 120 x 300 ft., to be completed about July 1. The Goodrich Company, which is just completing large additions to its plant, is reported to be planning for the erection of three more large buildings of steel construction, two of them to be six-story structures. The Firestone Tire & Rubber Company is reported to be preparing plans for new buildings and a power plant, involving an expenditure of $350,000, on which it is expected work will be started in the spring. The Buckeye Rubber Company is now building an addition, 62 x 208 ft., one story high, and the Swinehart Tire & Rubber Company has a two-story addition under construction, 62 x 150 ft.

The Oscar Lear Automobile Company, Springfield, Ohio, is in the market for about 40 machine tools for additional equipment for its machine shop and other departments, the tools being desired for as early delivery as possible. The company states in sending out its list that where certain makes of tools are named the names are given to indicate the general size and requirements and that bids will be received on other machines of corresponding sizes. The list follows: One four-spindle multiple movable spindle gang drill, one No. 3 universal Landis grinder, one Heald cylinder grinder, one Atkins high speed power hack saw, one cam grinding attachment for Landis grinder, one large and one small Greenard arbor presses, one 36-in. Bullard boring mill, turret head; one 18-in. turret lathe, Springfield Tool Company; two 2-in. lathes, Jones & Lamson, one bar and one chucking; one 30-in. Fellows gear shaper, two automatic screw machines, one Pilgrim bevel gear planer, one No. 13 Brown & Sharpe 36-in. automatic gear cutter, one large vertical miller, one 18-in. Higley cut-off saw, one No. 4 and one No. 3 Cincinnati miller, plain; one crank case boring machine, one 24-in. Cincinnati drill, power feed, back geared; one same, power feed radial table, back geared; one valve grinding machine, one air compressor, eight air drills, one eight-spindle multiple drill, two 4 x 14 in. Pratt & Whitney lathes, one with relieving attachment and both with taper and collet attachment; one Cincinnati cutter grinder, two arbor presses, one Yankee drill grinder, one shaft straightening machine, one Pratt & Whitney patternmakers' lathe, one 16-in. jointer, one 12-in. rip saw and one pneumatic riveter.

The Cleveland Drop Forging Company, Cleveland, Ohio, has commenced the erection of additions to its plant which will give it about three times its present capacity. The company has placed orders for six additional drop hammers and expects to buy 12 more drop hammers within the next few weeks. To provide for the extensions the company has increased its capitalization from $25,000 to $75,000. At a recent meeting changes were made in the officers of the company, the new officers being as follows: Thomas Reid, president; L. Victor Teeple, vice-president and general manager; Thomas Morris, secretary. The company reports that its business is very satisfactory, having all the orders that it can fill.

The Grant-Lees Machine Company, Cleveland, announcement of whose proposed extensions were recently made in these columns, states that it has completed the purchase of its machinery requirements of turret lathes, automatic machines, gear cutters and grinders, aggregating about $40,000. The company has commenced the erection of an addition to its plant, 50 x 200 ft., three stories high, of concrete construction. This will more than double the capacity of the present plant. The Grant-Lees Company makes a specialty of automobile steering and spiral gears. When the additions to the plant are completed the output of beveled gears will be largely increased.

The Abbott Motor Car Company is the name of a new automobile concern in Detroit, just incorporated with a capitalization of $300,000. Charles S. Abbott is president. The company is located in the plant formerly occupied by the Northern Automobile Company at Champlain and Canton avenues.

The Standard Tool Company, Cleveland, maker of twist drills, reamers, &c., is increasing considerably the capacity of its plant. This company reports the receipt of a large number of orders, which are sufficient to keep its plant running at full capacity.

The Mechanical Rubber Company, Cleveland, will enlarge its plant by the erection of two new factory buildings, one three stories high, 50 x 57 ft., and the other 38 x 138 ft., four stories high.

The Canton Buggy Company, Canton, Ohio, of which D. L. Tschantz is president and treasurer, will begin the manufacture of automobiles. The company has under consideration the building of an addition to its plant in the spring. A two-story building, 80 x 120 ft., is proposed.

Plans are under way for the organization of a new company in Akron, Ohio, for the manufacture of automobiles, and it is announced that sufficient capital has been assured for the carrying out of the project. O. V. Dibble of Wadsworth, president of the Buckeye Match Company, will be president and manager of the company.

The Standard Mfg. Company, Columbiana, Ohio, has been formed to manufacture a vacuum cleaner. The company is capitalized at $10,000. C. D. Rymer and others are interested in the company.

It is announced from Orrville, Ohio, that the Razor Furnace Company of Barberton, Ohio, will be consolidated with the Service Pump & Foundry Company of Orrville. The departments will be run independently and the products will be marketed under their present names, the Service pumps and Razor furnaces.

The Otto Konigslow Mfg. Company, maker of sheet metal stampings, has secured a new site at Perkings avenue and East Thirty-fifth street, Cleveland, and will at once begin the erection of a new plant. The company is crowded with work and finds its present quarters at Central avenue and the C. & P. Railroad too small to accommodate its growing business. The new plant will have a capacity of three times that of the present one.

The Standard Brass Foundry Company, Cleveland, will enlarge its plant by the erection of a new building, 60 x 150 ft., which will be used as an addition to its aluminum castings department.

At the annual meeting of the Cleveland Employers' Association, held November 30, Walter D. Sayle, president of the Cleveland Punch & Shear Works Company, was elected president; W. B. McAllister, first vice-president; Richard A. Feiss, second vice-president, and O. M. Stafford, treasurer. Steps were taken for the establishment of an employment bureau for the benefit of independent working men in Cleveland and vicinity.

Cincinnati Machinery Market.

CINCINNATI, OHIO, December 7, 1909.

Uniformly encouraging conditions prevail in the tool manufacturing districts. Practically every shop in the district is working on full time, a few on extra time, and hardly an establishment has the force of skilled men that could be utilized. Taking the entire field into consideration, the pay rolls are probably from 10 to 15 per cent. short in number of envelopes, although very little if any less in the aggregate of money to employees.

The encroachments of the automobile manufacturer have been felt in this field, and probably as severely, if not more so, than any other of the toolmaking districts; but skilled mechanics in number who have established good homes here, and were kept on the pay rolls during the last and former periods of depression, have steadfastly ignored the alluring promises of the big automobile manufacturers. Cincinnati has always suffered in the sense that she has been regarded as the home of the expert mechanic and toolmaker, which suggests to enterprising manufacturers, immediately they want help, here is the place to come for it. The automobile people are not the only malefactors. When Cincinnati was

the headquarters of the National Metal Trades Association resident members of that organization were called upon to protest vigorously and often. When an expert toolmaker was needed in the North or the East or the New England States the commissioner of the national organization was called upon for help, and, being an enterprising and capable official, he went to the nearest and the best source for his help—and that was the Cincinnati field.

Then when the national office was moved to another Ohio city, in order to put it into quicker mail communication with New York and the East, and Cincinnatians had begun to congratulate themselves, the automobile manufacturer comes along with his inflated purse.

Taking everything into consideration, however, the Cincinnati toolmaking field is in excellent condition, and this will be reflected in the sayings and doings at the dinner of the Cincinnati branch, National Metal Trades Association, at the Business Men's Club on the 15th. Secretary John M. Manley is daily receiving acceptances from neighboring and nearby cities. In addition to the delegations from Indianapolis, Cleveland, Muncie and other cities mentioned in this letter last week, there will be visitors from large manufacturing enterprises in Dayton, Lima and Middletown, Ohio, Connersville and Ft. Wayne, Ind., and other cities.

From the dealer's viewpoint trade is steady, with a splendid outlook for the new year. As a rule it is the better class of machinery that is moving, and, unlike the trade of a few months ago, the heavier tools are in favor also. Radials have been inactive, until a very few weeks ago, but interest has steadily increased until to-day manufacturers producing this heavy line are feeling very much encouraged. Planers are also active. Screw machines and the turret lathes are increasing in interest. Reports indicate that the brass working institutions are getting busy, and there is a demand for brass working lathes and similar machinery.

The Cincinnati Car Company, with shops at Winton place, Cincinnati, is working full time and capacity. Plans have just been completed for a large addition, 100 x 250 ft., in which additional facilities will be made for the erecting shops, blacksmith and foundry. There will be some new machinery purchased also—hammers, a punching machine or two, bending and straightening machines, etc. Additional switching facilities will also be provided to the line of the Cincinnati, Hamilton & Dayton and the Baltimore & Ohio Southwestern. The improvements will cost in the neighborhood of $25,000.

Among the items of large machinery sold during the week in this field a 48-in. punch for making 4-in. holes through ½-in. plate, manufactured by the Cincinnati Punch & Shear Company, goes to the S. H. Roberts Boiler & Mfg. Company, a new institution near Pittsburgh. This company notes that business has improved in the heavy lines at least 50 per cent. in the last two months.

The National Machinery Company, Tiffin, Ohio, has been incorporated by Harry J. Weller, William L. Hertzer, Augusta Rohn, Eary Frost and Mesleh Frost; capital, $15,000.

Information from Middletown, Ohio, which has not yet been confirmed, says that there will be established in that city a factory for the manufacture of flying machines, the first machine to be built for the international aviation contest to be held in this country next year. Principal stockholders are said to be members of the Grand Rapids (Mich.) Furniture Company and a motorcycle concern of Middletown. Dr. William Greene of New York, an aeroplane inventor, is said to be at the head of the enterprise. His machine will be the smallest in the field and be equipped with a 50-hp. engine.

Word from Shelby, Ohio, indicates that the Ohio Seamless Tube Company has orders on its books that will keep the plant busy the entire winter with a full force on extra time.

The Jones Machine Pump Company of Shelbyville, Ind., a recent incorporation, is reported to have met with great success through its patents, which are now all controlled by the company, their purchase from the inventor, Charles S. Jones, having been recently consummated. Mr. Jones' stock, 40 per cent. of the total, was purchased by Harry Hagemann, R. B. Minnis, C. Jensen and T. E. Goodrich, the remaining stockholders, and Mr. Jensen was selected to be general manager. Walter O'Neil, formerly of Columbus, was made shop foreman.

The annual banquet and entertainment of the Republic Stamping & Enameling Company at Canton, Ohio, is reported to have been the prize affair of the kind in the history of the company, which every year gives a special entertainment for its employees.

The Sperry Mfg. Company, Ft. Wayne, Ind., is installing some machinery adapted to the manufacture of hickory handles for small tools, a line which it has recently added.

The Inland Steel & Castings Company, Terre Haute, Ind., has determined to enlarge the plant and the work already commenced will mean an expenditure of from $7000 to $8000. This is a new institution for the Indiana city and its success is reported to have been remarkable.

The Trebert Gas Engine Company will move from Rochester to Butler, Ind., the citizens of the latter town having subscribed $35,000 as an inducement, giving them a controlling interest.

The National Wire Bound Box Company, South Bend, Ind., has increased its capital stock from $200,000 to $230,000. G. C. Babcock is president.

The Ideal Sanitary Mfg. Company has been incorporated at New Carlisle, Ind., with $27,000 capital stock, to manufacture patented utensils. The directors are L. J. Graffort, T. E. Brown, S. D. King, P. L. Hoffman and O. C. Bormann.

The Lunkenheimer Company, the largest manufacturer of high grade engineering specialties in the world, tendered its employees and families a Thanksgiving dance in one of its new factory buildings in Cincinnati on the evening of November 24. About 3000 people attended and an elaborate luncheon was served.

Milwaukee Machinery Market.

MILWAUKEE, WIS., December 7, 1909.

Orders for machinery, tools and appliances are now being placed for some time ahead and in most lines trade is settling down to a generally sound basis, although the influence of contracts recently taken at inadequate prices continues to be felt as a disturbing factor. One effect is in the foreshadowing of labor troubles. Molders and machinists, observing the rush of new business and reading in the daily papers of great activity—presumably very profitable—at the shops in which they are employed, feel that they ought to share more largely in the returning prosperity, particularly if they are still working under a reduced scale of wages. Inevitably many have to be disappointed, for reasons recently outlined in this report, and it becomes increasingly difficult to make them see the necessity for it. The first visible outbreak has been smoothed over, as cited below, but there will probably be recurrent difficulties. Local manufacturers are consequently chary of giving out for publication any statements concerning contracts taken. When, however, business is again normal in every sense of that word, so that wage schedules can be fully restored, there is little likelihood of further trouble, and any that may occur meanwhile will be of a transitory nature—certainly not enough to effect deliveries—as the labor unions show no disposition to make excessive demands.

An industry that is growing by leaps and bounds is the furnishing of pressure machinery for mechanical filtration, as well as for purification plants used in a large number of manufacturing processes. Pumps and air compressors are among the heaviest details of this apparatus, but there is a multitude of other appliances which different methods of purification require. Among municipalities and sanitary districts those of the West and Southwest are the largest purchasers.

For many purposes manganese bronze, which was popular here some time ago and then fell off in use as a result of the high cost, is again displacing steel, largely because of its anti-fatigue properties. In parts subject to severe or particularly continuous vibratory stresses this metal is found especially valuable. During the next few months equipments for the manufacture of manganese bronze castings will be ordered by a number of private plants, and the brass foundries are also likely to be given all the custom work they can handle.

Prospecting for ore on the iron ranges of Wisconsin and the Upper Peninsula is being systematically carried forward with great vigor at the present time, along the lines indicated in the State geological survey, and large financial interests are promoting the movement. Development work, wherever started, is accordingly prosecuted with the aid of the best modern machinery, and there will be heavy orders placed for equipment throughout the coming year. From the mines and crusher houses to the holds of lake carriers, electricity is everywhere being utilized as operating power, and the tendency is developing more and more to generate current almost exclusively in central stations—frequently for distribution over a considerable mine, yard or dock area. Near Negaunee the Cleveland-Cliffs Iron Company will soon have in operation two new steam turbine plants, and other companies are planning similar installations. Hydro-electric power sites are also being located and preempted for the same purpose. Small isolated steam or gasoline engine driven plants have come to be the exception where there is any community of interest.

From Port Washington, Wis., it is reported that three carloads of gasoline engines for Pacific Coast, New England and Missouri Valley points were recently shipped in one week from the plant of the Gilson Mfg. Company.

The Kissel Motor Car Company, Hartford, Wis., is buying electrical equipment for its new factory buildings.

The Sternberg Mfg. Company has been incorporated here for $50,000 by Wm. Sternberg and others.

It is reported that a plant occupying nearly 20 acres will be erected by the Berlin Machine Works, Beloit, Wis.,

to take the place of its present shops, which are inadequate to the demands of the business.

The Manitowoc Iron & Metal Company has leased a plant at Manitowoc, Wis., in which a brass foundry will be installed.

A Gates crusher, hoist and other machinery driven by electric motors is being installed by the Falls Stone Quarry & Lime Kilns Company, Sheboygan Falls, Wis. Other improvements in the plant will be necessitated later by the increasing demand for its product.

A power plant to operate elevating and handling apparatus will be built by the Jefferson Ice Company, Kenosha, Wis., at Powers Lake.

A new steel gas holder of 200,000 cu. ft. capacity is to be erected by the Sheboygan Gas Light Company, Sheboygan, Wis.

An addition 60 x 80 ft. will be made to the foundry of the Schaefer Company, Berlin, Wis., and some new equipment is required.

The Vetter Mfg. Company, Stevens Point, Wis., has perfected plans for changing over its power system to one of electric motor drive. Other new machinery will also be needed.

One of the machine shops in this State, the name of which local interests do not wish to have mentioned, has been dismantled. The machinery will be installed in the new factory of the Oklahoma Gas Engine Company, Oklahoma City, Okla., of which W. H. Fishbeck is president and manager. A foundry will be built in connection with the new establishment.

The C. A. Goodyear Company, Tomah, Wis., is putting in operation a new steam turbine power plant of 1200 hp., and electric motors for alternating current will be used for driving the planing mill machinery as well as in the main mill.

The Biddison Mfg. Company, Madison, Wis., is putting on the market force feed lubricators for gas and gasoline engines.

The Lyons Boiler Works, De Pere, Wis., in addition to the extensions recently referred to, may erect a branch shop at Green Bay.

The municipal power plant at Kilbourn, Wis., which was recently wrecked, will probably not be replaced, as arrangements have been made by the city to buy current from the new hydro-electric generating station of the Southern Wisconsin Power Company.

One of the most important contracts for steel bridges to be let during the coming year will be for a structure 500 ft. long, which is to be built by the Chicago & Northwestern Railway across the Fox River at Kaukauna, Wis.

The new foundry and metal working plant of the Sailer-Whitmore Company, Neenah, Wis., construction of which was recently mentioned in *The Iron Age*, has been badly damaged by a windstorm, necessitating considerable replacement of structural material and equipment.

The Worden-Allen Company, Milwaukee, has been awarded contract for two steel frame buildings, 90 x 300 ft. and 50 x 320 ft., to be erected by the Beaver Dam Malleable Iron Company, Beaver Dam, Wis. Equipment details have already been referred to in this report.

The growing importance of Milwaukee as a center for the production of heavy electrical apparatus, in addition to engine or turbine driven generating sets, is evidenced by numerous orders now being taken for large power transformers. Business with the Pacific Coast alone includes contracts from the Southern California Edison Company, Los Angeles, Cal.; Great Western Power Company, San Francisco; Pacific Gas & Electric Company, San Francisco; Bear Lake Power Company, Montpelier, Idaho; Portland Railway, Light & Power Company, Portland, Ore.; Sacramento Valley Power Company and Los Angeles Gas & Electric Company. These transformers, which will be built by the Allis-Chalmers Company, vary in size from 200 kw. to 1500 kw., and for the most part are of the oil filled water cooled type. As many as 16 of these huge transformers are to be installed for one company.

The Consolidated Sheet Metal Works, Milwaukee, has contract for the work on the new factory of the Kalt-Zimmers Mfg. Company.

New England Machinery Market.

BOSTON, MASS., December 7, 1909.

November proved the best month of the year with the machinery dealers, as was expected. It is conservatively estimated that the business amounted to about 85 per cent. of that of the average month during the flush market of three years ago, but this estimate includes supplies, and possibly on machinery alone the figure may be a little high. Such a representative line as that carried by the Fairbanks Company reached the 85 per cent. mark, and inquiries of other dealers indicate that this is about the common experience. The first week of December is most encouraging, though it is hardly to be expected that the closing month of the year will show much gain, if any, because of the holidays and also because it is the period of inventory taking with many concerns.

The plant of the Boston Gear Works, Norfolk Downs, Mass., was not damaged in the recent fire to near the extent that was at first feared. The greater part of the machinery escaped permanent harm. The company began manufacturing in other quarters in two days after the fire, and the work of replacing the building has been pushed with such vigor that production will be resumed in the plant by the last of the present week. The company states that it will probably need little new equipment to replace machinery. Some tools which had already been ordered will be set up as soon as delivered.

The business of Crawford & Co. and the Lombard Machine Company, Worcester, Mass., has been consolidated as the Brierly-Lombard Company. Crawford & Co. deal in mill supplies. The controlling interest was recently acquired by John T. Brierly. The Lombard Machine Company manufactures textile machinery. The consolidation provides for the manufacture of the new Lombard loom and the marketing of the product.

The Brass Products Company, Southington, Conn., manufacturer of electric and combination fixtures, is adding to its finishing department, and has tentative plans for other additions to be made later.

The Liberty Cartridge Company, Mt. Carmel, Conn., is establishing a toolroom and machine shop. Present requirements of machinery have been provided for. The company will manufacture a new shell and primer for shotguns, and at the present time is building tools and gauges and perfecting the product, preparatory to building a factory.

The Osgood Bradley & Sons Company, Worcester, Mass., builder of steam and electric passenger coaches, is rushing preparations for the creation of its new plant at Greendale. Gangs of men are working day and night grading the ground, and the contracts for most of the buildings are let. The works will be large, with far greater capacity than those they will replace, and not a little new equipment will ultimately be required.

Additions to manufacturing plants outside of metal lines, include the following: Lawrence Duck Company, Lawrence, Mass., mill; Niantic Menhaden Oil & Guano Company, Niantic, Conn., new plant to replace that just destroyed by fire; West Boylston Mfg. Company, Easthampton, Mass., mill building 40 x 75 ft., three stories; Goodall Worsted Company, Augusta, Maine, addition to mill, 60 x 80 ft., four stories; American Hosiery Company, New Britain, Conn., new building; United Illuminating Company, New Haven, Conn., addition to power house for boiler room; Northhampton Silk Company, Northhampton, Mass., mill to employ 250 hands; Saugus River Peat Company, Saugus, Mass., experimental station at Lynnfield Center, Mass., for testing various fuels, including peat; Pacific Mills, Lawrence, Mass., new mill to employ 2000 operatives; Vernon Woolen Company, Rockville, Conn., mill to replace one recently burned; Naumkeag Steam Cotton Company, Salem, Mass., weave shed, 214 x 250 ft.; Appleton Cotton Mills, Lowell, Mass., boiler house, 50 x 60 ft.

The Globe-Taunton Nail Company, Taunton, Mass., will build a new plant immediately, to replace the buildings destroyed by fire in September. A one-story machine building will be 100 x 300 ft., with ells 18 x 100 ft. and 30 x 40 ft., respectively. Either brick or concrete will be used. The engine house will be a separate building. The equipment to be purchased includes a 350-hp. engine, 350-kw. generator, 12 electric motors, shafting, two second-hand cars and 300 ft. of second-hand track. The site is at Arlington street and Railroad avenue, where a spur track will be available. The factory building will be arranged to receive rods at one end and deliver the finished product to the shipping room at the other end. The company is now manufacturing in temporary quarters.

Palmer Bros., Cos Cob, Conn., manufacturers of gasoline engines and launches, are erecting a new building, 75 x 80 ft., for which some new machine equipment will be required.

The Deane Steam Pump Company, Holyoke, Mass., will erect a pattern building, 50 x 200 ft., five stories, of brick and steel, and a three-story brick stock and shipping building, 45 x 232 ft. These structures are in addition to the new machine shop, details of which have already been published.

The Geometric Tool Company, New Haven, Conn., manufacturer of special machinery and tools, has under consideration the erection of a factory extension, probably of reinforced concrete. The size is not yet decided. It is necessary to add to floor space because of a rapidly increasing business. The company has recently built an addition to its grinding room, doubling its capacity, and has added machinery which has largely increased production throughout its plant.

The Pratt & Whitney Company, Hartford, Conn., manufacturer of machinery and small tools, has voted to increase its capital stock from $2,750,000 to $4,000,000, the action being taken at a meeting held last week at Jersey City. The new stock is divided into $475,000 of common and $775,000 of preferred, increasing each to $2,000,000. The

common stock will be taken at par by the Niles-Bement-Pond Company, which holds the entire issue, while the preferred will be offered to present shareholders, also at par.

The Lincoln Iron Works, Rutland, Vt., manufacturer of stone working machinery, is erecting an addition 50 ft. square for its boring mills and pulley machines. The equipment has been ordered.

At the annual meeting of the Wells Bros. Company, Greenfield, Mass., manufacturer of Little Giant taps and dies, bolt cutters, nut tappers, &c., Franklin E. Snow retired from the office of treasurer, after 29 years of service with the company, most of the time in the office which he now resigns. Frank O. Wells was elected president and treasurer and Mr. Snow vice-president. They, with Franklin K. White, Edward Blake, Jr., and William M. Pratt, constitute the Board of Directors. The office of vice-president is a new one, and Mr. Blake and Mr. Pratt are additions to the directorate. Mr. Snow disposes of a part of his stock, retaining a one-third interest. He retires to secure a long rest. He became connected with the company when it was doing business in a small way, and has been a most important factor in building it up to its present large proportions, requiring a modern plant, which has been growing constantly in size and equipment.

Miscellaneous Machinery and Power Equipment.

A concentrating plant of 100 tons capacity will be erected by the Arbuckle Lead & Zinc Mining Company, Marietta, Okla.

W. A. Corder Company, Wilkeson, Wash., requires a belted generator of 150 hp.

The Waynesburg & Blacksville Street Railway Company, Waynesburg, Pa., recently mentioned in this paper, is proceeding with plans for the building of a power house and repair shops. Machinery specifications will be prepared shortly.

Tubular boilers, automatic stokers, steam driven electric generating units, pumps, heater, condensers, &c., will be required for a new power station to be built by the Wichita Railway & Light Company, Wichita, Kan., if present plans are carried through. The capacity proposed is 1500 kw.

E. M. Masterson, Angleton, Texas, is in the market for boiler, engine, generator and refrigerating machinery.

The Conger Safe Company, Oklahoma City, Okla., is having plans drawn for the erection of a factory, which will be equipped with machinery for the manufacture of heavy vaults, safes and structural steel for protective purposes in banks, offices, &c.

A. J. Botton Company, Rochester, N. Y., will install two engines and generators with an aggregate capacity of about 300 hp.

The Union Steam Pump Company, Battle Creek, Mich., has decided upon two large additions to its plant, contract for the construction of one of which has just been awarded. Power machinery, forging and machine tools are understood to be among the requirements for equipping the extensions.

The Michigan Motor Casting Company, Flint, Mich., is making some improvements in its equipment and will probably require additional machinery before spring.

A new power plant of large capacity will be built by the Ashland Gas & Electric Company, Ashland, Ohio, and probably equipped with gas engines or steam turbines rather than Corliss machines.

Pumping machinery for a water system will be bought at Hominy, Okla., about January 1. Plans have already been drawn.

Construction of ore reduction works, including a smelter, is under consideration by the El Porvenir Copper Mining Company, Margarito Romero, general manager, Las Vegas, N. M.

A crushing machine for experimental work will be installed by the Detroit Lead Pipe & Sheet Lead Works, Detroit, Mich.

A power plant is to be erected shortly by the Pt. Arthur (Texas) Traction Company and some light motor driven tools for repair work will probably be installed in connection with it.

The Bristol Gas & Electric Company, Bristol, Tenn., whose plans for a large hydro-electric plant were recently mentioned, also contemplates the building of a substation in the city equipped with large step-down transformers and one or more rotary converters.

A pumping station and steel storage tank will be erected by the Allen Water Company, Allen, Texas.

The Elyria Iron & Steel Company, Elyria, Ohio, is making some improvements to its equipment, including the purchase of additional electrical apparatus.

Ground will be broken shortly for a factory to be erected by James J. Broisett, Salt Lake City, in which to build ore reduction machinery.

Several power transformers of large size are to be added to the transmission system of the Southern California Edison Company, Los Angeles, Cal.

Pumping machinery for a system of water supply will probably be bought in the near future at Morehead, N. C., a bond issue having been authorized for this purpose.

A new central power plant equipped with turbine units will probably be erected in the near future for the Pillsbury mills at Minneapolis.

Quarry, power and cement making machinery for a 2000-bbl. plant is to be bought about February 1 by the Morgan Portland Cement Company, recently organized at Allentown, Pa.

A large new plant will be built at Kansas City, Mo., by the Indiana Silo Mfg. Company of Anderson, Ind. All of the machinery is to be electrically operated, but commercial power may be used.

The Syracuse Power & Light Company has been incorporated at Syracuse, Ind., with $30,000 capital stock, by Joseph P. Dolan, Lewis A. Neff and Herman D. Boozer.

The Stutz Auto Parts Company has been organized at Indianapolis, Ind., and incorporated with $10,000 capital stock, to manufacture parts for automobiles. The directors are H. C. Stutz, C. E. Stutz and H. F. Campbell.

The D. & B. Surgical Instrument Mfg. Company, Indianapolis, Ind., has been incorporated, with $25,000 capital stock, to manufacture surgical instruments. The directors are G. E. Denny, J. H. Calvert and E. T. Buck.

The Muncie Gas, Light & Fuel Company, Muncie, Ind., has been sold for $225,000 to the Western Water, Light & Traction Company of Chicago, which, it is reported, will at once proceed to build an artificial gas plant in Muncie to cost $150,000.

The Board of Public Works and the Board of School Trustees of Anderson, Ind., are considering plans for a municipal steam plant to heat the city's school buildings. A consulting engineer of Detroit estimates the cost will be $40,000.

Hugh Carney, City Secretary, Atlanta, Texas, is ready to receive bids for furnishing pumps, gas engines, &c., necessary for the construction of the water works system at that point.

Hoists and a centrifugal pump, as well as other machinery are required by the Perry Sand Company, Buffalo, N. Y.

The electrical equipment of the municipal power plant at Chambersburg, Pa., will be considerably improved during the coming year and a new generating unit may be purchased shortly.

The Buffalo, Rochester & Pittsburg Railway Company, Rochester, N. Y., will install a tie treating plant at Bradford, Pa., the equipment to include impregnation cylinder, pump, compressor, steel frame tie cars, &c., as well as power machinery.

The authorities at Mendon, Mich., have under consideration the construction of a hydro-electric plant at Parkville, Mich., and an option on the water power there has been secured. If this plan is consummated current will be generated not only for the city's lighting and other service but also for commercial load supply to local industries.

An electric power and pumping station will be built during the coming year at Conrad, Mont. It has not yet been decided whether this will be operated by the city or a franchise granted to a private corporation.

The Board of Public Works at Cadillac, Mich., has been instructed by the Common Council to prepare plans and estimates for a sewage pumping station. Centrifugal pumps are favored.

A gas producer, gas engine and electric dynamo of about 200 kw. will be added to the power plant of the Cherryvale Electric Light & Power Company, Cherryvale, Kan. No purchases are to be made until after January 1 and probably not until some time later.

The Clarendon Water Works & Light Company, Clarendon, Texas, will be in the market for some equipment during the next month or two.

An electric hoist is required by the Chicago Union Lime Company, Chicago, Ill., and other apparatus will be purchased in the near future.

Power and woodworking machinery is needed for a new plant to be built by the Reed City Veneer & Panel Company, Reed City, Mich.

The project for a new municipal power station at Sturgis, Mich., has reached the stage where bids on machinery will be called for shortly, as plans are now being prepared.

A new pumping unit may be installed this winter in the municipal plant at Marshall, Ala. Other improvements in the water works equipment have also been decided upon.

The Anhut Motor Company has been organized at Detroit, Mich., by John N. Anhut and will erect a plant of considerable size as soon as a location has been decided upon.

It is reported from Gurley, Ala., that the Gurley Light & Power Company, recently organized, is in the market for electrical machinery.

Oil filled self-cooled static transformers of 300 to 500 kw. will be required by the Phœnix Light & Power Company, Maumee, Ohio.

One of the largest pumping plants in the Southwest is to be built by the Pike County Water Works Company, Murfreesboro, Ark., which is now having the plans drawn.

Specifications covering the machinery required will be ready on or before February 1.

A steel tower and tank will be added to the water works system at Bartlett, Texas. Bids have not yet been taken.

The Platt Iron Works, Atlanta, Ga., will install additional motors for electric drive.

A hydro-electric power plant of about 5000 kw. capacity is to be erected near Porterville, Cal., by a company of which S. E. Henley of that place is reported to be the head.

An engine and electric generator will be installed this winter in the municipal power and pumping station at Marietta, Ga.

Some new equipment will probably be required before spring for the pumping station at Columbia, Mo., where extensive improvements are now under consideration.

As the result of a recent fire the plant of the Deyo Gas Engine Company, Binghamton, N. Y., will be reconstructed along the best modern lines and equipped with improved machinery.

As a resut of the greater economy shown by the pumping engine recently put in service at Nashville, Tenn., which is said to have the largest horsepower of any unit for this service in the world, the three old engines in the water works are to have improvements made to them which will considerably increase their efficiency. About $15,000 is expected to be spent in repairs and alterations.

R. A. Carr, Maysville, Ky., will be in the market shortly for power machinery with which to equip a new mill.

During the coming year one of the largest power developments in the country, involving a chain of electric plants extending along the Sangre de Cristo and Culebra ranges, will be built by the Southern Colorado Power & Railway Company, if the present plans for reorganization are consummated. Extension of the company's traction lines is also proposed. Headquarters are at Trinidad, Colo.

The new electric generating plant purchased by the Prison Commission of Tennessee, to which reference was made in *The Iron Age* some weeks ago, will be installed at the Petros coal mines, the equipment of which is undergoing extensive remodeling.

Power machinery is required by the Reuter Hub & Spoke Company, Dexter, Mo., for a new factory.

Pumping plant for a water works system will be erected in the near future at Donna, Texas.

Small gasoline engines for agricultural machinery will be manufactured at Des Moines, Iowa, by the Wilson Machinery Company, which has just been organized there.

A hydro-electric plant of 1000 kw. or upward will be built in the vicinity of Lewiston, Maine, by the United Light & Power Company. Specifications covering machinery have not yet been prepared.

O. J. Shaw, Aurora, Neb., has secured a franchise and will begin at once the erection of an electric light plant at Harvard, Neb., to be completed by March 1.

The Detroit Edison Company is arranging to build and equip a substation in the business district of Pontiac, Mich., for the distribution of electricity for power and lighting purposes.

The Birmingham Rail & Locomotive Company, Birmingham, Ala., has purchased a site and has plans prepared for the erection of a new factory building. The company advises, however, that it will not commence work upon the new improvements until the early part of next year.

R. A. Duff & Co., Nebraska City, Neb., have designed a multiple jet carbureter, the first models of which will be completed within the next 30 days. If the new design proves successful the company will erect a factory in the spring for its manufacture.

The Wind Power Electric Company, Madison, Wis., has been incorporated, with capital stock of $30,000, to manufacture an electric lighting plant which through wind power or gasoline engine will generate current enough for general lighting and power purposes on the farm.

The Leader Foundry & Machine Company, Quincy, Ill., which recently took over the plant and business of the Sharpe & Becker Machine Company, is erecting a new plant 96 x 100 ft.

The Hancock Mfg. Company, Charlotte, Mich., contemplates the erection of a new brass foundry.

The Reliance Motor Truck Company, Owosso, Mich., subsidiary of the General Motors Company, has purchased a site containing 20 acres and will erect a new building in the spring at a cost of $75,000.

The Chicago Foundry & Machine Company, Kalamazoo, Mich., has commenced work on the erection of a new factory building.

The Republic Fence & Wire Company, North Chicago, Ill., has been incorporated, with capital stock of $100,000, by James G. Arthur, Frank P. Baum and Richard A. Little. The company will manufacture and deal in wire and iron fencing, gates, posts, &c.

The Big Naunga Power Company, Jefferson City, Mo., recently incorporated, will establish a water power plant to generate from 1600 to 2400 hp. The company will also construct a dam to cost about $45,000.

Apache, Okla., has engaged the Southwestern Engineering Company, Oklahoma City, Okla., to prepare plans for the construction of a water works system and electric light plant.

Bids will be received by Belden, Neb., until December 15, for the construction of water works system. All bids formerly received were rejected.

The Bridgewater Electric Power Company, Bridgewater, S. D., organized with capital stock of $10,000, will erect a power plant which is to be equipped with a 36-hp. oil engine and 25-kw. generator and tank, none of which has been purchased as yet. A. M. Weidenbach is manager of the company.

The Standard Pattern Works, Detroit, Mich., has completed the erection of a building designed for the exclusive manufacture of patterns. The new factory has a capacity for 100 patternmakers.

Electric generating machinery and auxiliary apparatus will be required this winter by the Haskell Power Company, Haskell, Texas.

Motor driven pumps for its proposed water and sewage system at Rothchilds will not be installed by the Marathon Paper Mill Company, Wausau, Wis., until some time in the spring.

A pump of considerable capacity, to be engine or motor driven, will be needed for the new water works at Harrison, Ark.

The construction of a pumping plant is under consideration by the authorities at Mendon, Mich.

The plant of the Ferris Electric Light & Power Company, Ferris, Texas, which recently burned, will be rebuilt for greatly increased capacity.

B. H. Rainwater, Junction City, Ark., has had plans drawn for an electric lighting plant at Nashville, Ark.

Two alternating current motors will be installed by the Pennsylvania Coal & Coke Company at Ehrenfeld, Pa.

The Emaus Foundry & Machine Shops, Emaus, Pa., will be in the market for additional equipment within a few months.

The Toledo Light, Power & Mfg. Company, Toledo, Ohio, is extending its facilities and will install some new apparatus, including transformers.

The Southern Power Company, Charlotte, N. C., will require a large number of transformers at intervals during the coming year for use on its industrial power transmission systems.

Plans have been prepared by the Stroudsburg & Water Gap Street Railway Company, Stroudsburg, Pa., for a new electric generating station. Turbine or engine driven units, with pumps and auxiliary apparatus, will be bought in the near future.

Some new equipment will be bought this month or next by the Eureka Foundry & Machine Works, recently organized at Yazoo City, Miss., which will take over and improve an existing plant.

A. M. Bernard, who will build a factory at New Iberia, La., is expected to be in the market shortly for power and woodworking machinery.

A new plant is to be built or leased at Buffalo, N. Y., by the Greyhound Motor Works, recently organized, for the manufacture of motor vehicles, including gasoline engines. For details address W. C. Overman.

Machinery for cement making and gypsum refining will be contracted for before long by the Oklahoma Cement Products Company, Homestead, Okla.

An engine of considerable size, for belting to line shaft, is among the present requirements of the McCloud River Lumber Company, McCloud, Cal.

A steam turbine generating unit of 750 kw. will probably be purchased by the Orange & Rockland Electric Company, Monroe, N. Y.

Rock crushing machinery of large capacity will be required by the Scioto Stone Company, Columbus, Ohio, to replace a No. 8 breaker and other apparatus recently destroyed by fire.

The People's Light, Heat & Power Company, Salina, Kan., has in contemplation plans for doubling the capacity of its electric generating station.

A small hydro-electric plant will be built at Franklin, N. C., by Henry Cozad. Turbine and generator of about 250 hp. at normal rating are to be contracted for shortly.

A new power station is to be built at Lewisville, Texas, early in the coming year by the Lewisville Light & Power Company.

An addition to its plant will be erected by the Majestic Range Company, St. Louis, Mo. Motor manufacturers are figuring on machines for electric drive.

The property of the White Cliffs Portland Cement Company, White Cliffs, Ark., has been acquired by large financial interests and plans for a 3000-bbl. plant, equipped with 150 kilns, are being prepared. The machinery is to be motor driven, and power may be supplied from a hydro-

electric development on the Red River if gas engines are not installed.

A pumping plant and complete system of water distribution will be constructed at Broken Arrow, Okla. For machinery specifications address Archer & Rollins, engineers, Kansas City, Mo.

The Wysong & Miles Machinery Company, Greensboro, N. C., finds it necessary to provide for an extension to its plant. New equipment will be required at once.

The Shinbone Red Ore Company has been organized to open mines in Walker County, Ga., and will require a large quantity of machinery and material, including rails for a short line of railroad. For details address F. L. Miller or G. H. Miller, Chattanooga, Tenn.

The Scott County Mineral Company, Bristol, Va., will be in the market during the next few months for a large quantity of machinery to be used in mining and development work.

Some new machinery will be required after January 1 by the Wautauga Electric Company, Johnson City, Tenn., for its generating station.

A motor driven centrifugal pump will be bought shortly by the Commissioners of the La Marsh Drainage District, whose headquarters are at Pekin, Ill. Power will be supplied from the local electric plant.

The Wm. Gallaway Company, Waterloo, Iowa, is reported to be in the market for an engine and generator.

From Othello, Wash., it is reported that a large electrically operated factory, utilizing slate as its raw material, will be built there by the R. S. King Company of Seattle.

Pumping machinery will be purchased after January 1 for water works at Miles, Texas.

A new electric generating unit of about 500 hp. will be added to the power plant of the Prairie Pebble Phosphate Company, Mulberry, Fla.

The Summit Thread Company, East Hampton, Conn., which has been adding to its equipment, is now fully supplied.

The W. Eddy Plow Company, Greenwich, N. Y., has not yet completed plans for its proposed new plant and the company will not build until spring.

The Carnegie Steel Company of Pittsburgh has sent out an inquiry for an air compressor with a capacity of 500 cu. ft. of air per minute at a pressure of 25 lb. per square inch. The compressor is to be steam driven and will be installed in the Ohio Works, Youngstown, Ohio.

The Fort Wayne & Wabash Valley Traction Company will increase the equipment of its power plants at Huntington and Lafayette, Ind. The company will also erect a large car house at Lafayette and enlarge its present car house at Huntington, involving an expenditure of about $250,000 for the improvements contemplated.

Owing to an increase in its business the Syracuse Gas Engine Company, Syracuse, N. Y., manufacturer of marine gas engines, has recently reorganized and moved into new and commodious quarters. The capital stock under the new organization is $150,000. The new factory will have a floor space of 12,000 sq. ft. The officers are F. C. Eddy, president and treasurer, and E. J. Paradis, secretary and general manager. Mr. Paradis was formerly sales manager of the Smalley Motor Company and the General Machinery Company of Bay City, Mich.

Government Purchases.

WASHINGTON, D. C., December 7, 1909.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until December 28 for two screw cutting extension gap lathes for the Mare Island Navy Yard, and until December 14 for four 18 in. x 12 ft. engine lathes and two 24 in. x 18 ft engine lathes for the Portsmouth Navy Yard.

The Constructing Quartermaster, Washington, D. C., will receive proposals until December 27 for the construction of an electric lighting system at Fort Washington, Md.

The following bids were opened November 29 for machinery for the navy yards:

Class 71.—One flat turret lathe—Bidder 116, Jones & Lamson Machine Company, Springfield, Vt., $1350.

Class 72.—One horizontal boring and drilling machine—Bidder 174, Niles-Bement-Pond Company, New York, $3490; 189, Prentiss Tool & Supply Company, New York, $3410.

Class 73.—One set of bending rolls—Bidder 26, Bertsch & Co., Cambridge City, Ind., $1145, $1110, $1170 and $1200; 58, Drew Machinery Agency, Manchester, N. H., $1130; 78, Frevert Machine Company, New York, $1492; 105, Hilles & Jones Company, Wilmington, Del., $1398; 173, New Doty Mfg. Company, Janesville, Wis., $1133.50; 174, Niles-Bement-Pond Company, New York, $2230; 189, Prentiss Tool & Supply Company, New York, $1407; 255, Wickes Bros., Saginaw, Mich., $993.50 and $1388.13.

Class 74.—One automatic gear cutter—Bidder 189, Prentiss Tool & Supply Company, New York, $2380.

Class 81.—One automatic screw machine—Bidder 25, Brown & Sharpe Mfg. Company, Providence, R. I., $1545; 175, National-Acme Mfg. Company, Cleveland, Ohio, $1616.

Class 82.—One belt driven slotting machine—Bidder 149, Manning, Maxwell & Moore, New York, $1725; 174, Niles-Bement-Pond Company, New York, $1597; 75, Fairbanks Company, New York, $1885; 210, William Sellers & Co., Philadelphia, $1545.

CONTENTS.

Trade Publications.

Lathe Tools.—Gisholt Machine Company, Madison, Wis. Catalogue. Loose leaf. Describes results that can be obtained from the company's line of turret lathes and shows an ideal tool outfit designed for use on the lathe with a view to minimizing the first cost of a lathe equipment and yet leave room for adaptiveness. This standard outfit is shown and tools for different purposes are designated by number and instructions in their use are given.

Steel Concrete Chimneys.—Weber Chimney Company, 929 Marquette Building, Chicago, Ill. Three booklets. This company makes a specialty of constructing reinforced concrete chimneys. One booklet contains a general description of the company's method of building chimneys and describes its steel reinforcement, which consists of two networks of tee steel. The distances between the bars of this network are different according to the size of the chimney. Views of some specially high chimneys made by the company are shown, including a 350-ft. chimney with inside diameter of 18 ft., which was built at the works of the Colusa Parrott Mining & Smelting Company at Butte, Mont. The chimney is shown in course of construction and complete. Other chimneys from 110 to 250 ft. high are shown. Another booklet gives a list of plants where the company's chimneys have been installed and the third booklet describes the origin and development of a concrete chimney.

Woodworking Machinery.—Grimm Mfg. Company, Buffalo, N. Y. Booklet. Describes the Grim woodworker, which is a compact portable planing mill with contained gasoline engine drive, and which can be used to rip saw, cross cut, jack saw, bore, join, mold, chip, cut grooves, plane and sand. The machine weighs only 350 lb. Illustrations showing the machine ready for this kind of work are given.

Gasoline Engines.—Fuller & Johnson Mfg. Company, Madison, Wis. Pamphlet. Describes the company's line of gasoline and kerosene engines designed especially for farm use. Standard types of the company's open type water jacket engines, which are made up to 18 hp., are shown and attention is called to a pumping engine operated by gasoline.

Gear Cutting Machines.—Newark Gear Cutting Machine Company, Newark, N. J. Catalogue, 6 x 9 in., 63 pages. A line of automatic gear cutting machines is shown, which includes automatic spur gear cutting machines, automatic spur and bevel gear cutting machines, special hobbing and gear cutting machines. Mention is also made of a machine of a horizontal pattern which is designed for cutting large and heavy gears. In this machine the work lies in a horizontal position, which it is claimed gives the equipment great rigidity. The cutter carriage is mounted upon the stanchion and in cutting spur and spiral gears the feed is downward. The drive is very powerful, so that the heaviest pitches can be cut, and when it is desired to cut fine pitches an auxiliary cutter spindle, which allows the use of smaller cutters, can be employed. Some especially heavy worm gearing made on this machine is illustrated. Useful tables and other information on gear cutting are included.

Screw Machinery.—National-Acme Mfg. Company, Cleveland, Ohio. Brochure. This is a neat publication largely given to a description of the company's plant, with some brief matter describing the Acme automatic multiple spindle screw machine. Brief mention is also made of the company's line of cap and set screws, nuts, &c

Rotary Force Pumps.—Goulds Mfg. Company, Seneca Falls, N. Y. Circular. Shows a line of hand and power pumps for handling cider, vinegar, wines, &c.

Vapor Condenser and Water-Jet Pump.—Schutte & Koerting Company, Philadelphia, Pa. New catalogue inserts. Section R of Catalogue 4, describes the Koerting obnoxious vapor condenser, and apparatus for condensing and deodorizing the gases from fertilizer works, packing houses, rendering works, &c. It employs water-sprays for creating the necessary draft, and so washing the gas as it passes through the apparatus. Section N of Catalogue 2 describes the Koerting deep-well water-jet pump for lifting water under pressure on the principle of an injector. A centrifugal pump circulates the water that by injector action lifts the water in the well. The advantages are that the driving apparatus, consisting of a pump directly driven by an electric motor, can be placed above ground where they are easy of access for attention; that the well can be completely emptied; that contact of air with the lifted water is avoided which would be likely to produce rusting, particularly if iron-salt is contained in the water; that the first cost of the installation is low, and that little space is required.

Hydrostatic Gauges.—Hydro Mfg. Company, 720 Lewis Block, Pittsburgh, Pa. Folder. Deals with the hydro recording volume and velocity gauge for measuring the rate of flow of gas in pipe lines or ducts, applicable in connection with melting furnaces, blast furnaces, coke ovens, mines, producer gas installations, gas works, &c.

Power Pumps.—The Deming Company, Salem, Ohio. Circular. Treats especially of power pumps for use in hotels and shows a number of views of such equipment in operation in the Marlborough-Blenheim Hotel in Atlantic City, N. J. This equipment includes pumps for hydraulic elevator service, for pumping sea water for hot water baths, pumping artesian well water and for boiler feeding.

Oil Fuel Burners for Foundry Uses.—Hauck Mfg. Company, 140 Cedar street, New York. Circular. This is a patent oil fuel burner, and a number of illustrations show the method of applying it in several foundry operations. The flame is directed by compressed air, and it can be used for quickly lighting a cupola, and, attached to a heating pipe, it can be used for ladle drying. It can also be utilized for repairing broken castings, drying or packing molds, &c. It is furnished in several sizes and styles, including compressed air apparatus with a tank capacity up to 16 gal., with a pump and oil tank combined and in portable style with kerosene torch. A special brazing forge and other special burners and furnaces are shown.

Factory and Farm Lighting Outfits.—Dayton Electrical Mfg. Company, Dayton, Ohio. Lighting bulletin No. 21. An isolated plant especially adapted for electric lighting on the farm is illustrated and attention is called to the fact that it obviates the danger of fire in farm houses and stables resulting from the use of coal, oil, acetylene or gasoline lamps. This plant can be furnished with a 2-hp. engine, and it gives a surplus of 1⅔ hp. over the lighting power needed, which may be used for driving a pump, sawing wood, &c. These plants are furnished with complete lighting equipment and the electrical fittings used with it are shown.

Plumbers' Tools.—Buffum Tool Company, Louisiana, Mo. Catalogue No. 1, section G, 7 x 10 in., 32 pages. A line of special chisels, such as cold chisels, diamond point chisels, oil groove chisels, key lifting chisels and the like are shown, together with gas burner pliers, right and left hand calking irons, calking hammers and similar tools. A pipe reamer which is made to handle pipe up to 2 in. is illustrated, with a set of tools used with it, and space is given to ladles, soil cups, hand saws, &c.

Plant Equipment.—Fairbanks Company, 703 Arch street, Philadelphia, Pa. Discount sheet. An advance discount sheet applying to catalogue No. 416 of this company has just been issued, which covers such articles under scales, transmission, valves, pipe and fittings, machine tools, mill supplies, gas engines and marine motors as are likely to be called for daily. In the near future the company will issue a complete discount sheet.

Steel Tanks.—Pittsburgh Steel Tank Company, Pittsburgh, Pa. Price-list. Gives a new list of prices on steel tanks ranging from 24 in. in diameter by 6 ft. long to 96 in. in diameter by 36 ft. long. The circular also gives the prices of extras and the prices of air receivers tested to 175 lb. pressure made in sizes of from 18 in. in diameter by 6 ft. long to 42 in. in diameter by 10 ft. long.

More Dodge Mfg. Company Improvements.

Ground had no sooner been broken for an additional warehouse at the plant of the Dodge Mfg. Company, Mishawaka, Ind., than plans and specifications were in the hands of contractors calling for an extension to the company's foundry wherein are located the machines, especially designed and constructed at a cost of $50,000 for the molding of all sizes of Standard iron pulleys.

The latest building will be 360 ft. long by 80 ft. wide. The walls call for brick, with steel trusses for the roof. Two cupolas, with capacities of about 8 and 10 tons per hour each, have been arranged for. An 8-ton electric traveling crane will operate between the cupola room and the supply yard, and in the foundry a 5-ton electric traveling crane will handle the castings and heavy working material. In connection with the foundry addition, the contract provides for an elevated coke shed, 240 ft. long by 15 ft. wide, with a Dodge conveyor attached for unloading cars. For charcoal and limestone new buildings are planned. Changes will be made in the coreroom and the sand sheds, and the yards generally will come under a rearrangement to facilitate the moving of cars and supplies. These improvements, together with the main machine shop extension, will make it possible to double the present output, which has long been necessary, owing to the demand for stock goods in the company's line of power transmission machinery.

The William J. Brewer Engineering Company, Troy, N. Y., is furnishing its oilless, frictionless and noiseless bearing to meet any speed or weight required. While the company's facilities for production are taxed by the present demand, it will shortly be in a better position to fill orders. Bearings are now being made for a wide variety of purposes, from sewing machines to shafting, ranging from 1 3-16 up to 9 in. in diameter.

CURRENT METAL PRICES.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from store—

Refined Iron:
1 to 1⅛ in. round and square, 1½ to 4 in. x ⅜ to 1 in., 1½ to 4 in. x ⅛ to 5-16 ₱ lb 2.00¢
Rods—⅝ and 11-16 round and square ₱ lb 2.20¢

Angles:	Cts ₱ lb
3 in. x ¼ in. and larger	2.25¢
3 in. x 3 16 in. and ⅛ in.	2.50¢
1½ to 2½ in. x ⅛ in.	2.35¢
1½ to 2¾ in. x 3-16 in. and thicker	2.25¢
1 to 1¼ in. x 3-16 in.	2.35¢
1 to 1¼ x ⅛ in.	2.45¢
⅞ x ⅛ in.	2.55¢
¾ x ⅛ in.	2.65¢
⅝ x ⅛ in.	3.70¢
½ x 3-32 in.	4.50¢

Tees:	
1 in	2.80¢
1¼ in.	2.60¢
1½ to 2½ x ¼ in.	2.30¢
1½ to 2½ x 3-16 in	2.50¢
3 in. and larger	2.30¢
Beams	2.25¢
Channels, 3 in. and larger	2.25¢
Bands—1½ to 6 x 3-16 to No. 8	2.45¢
"Burden's Best" Iron, base price	3.25¢
Burden's "H. B. & S." Iron, base price	3.05¢
Norway Bars	3.50¢

Merchant Steel from Store—

	per lb
Bessemer Machinery	2.00¢
Toe Calk, Tire and Sleigh Shoe	2.50@3.00¢
Best Cast Steel, base price in small lots	7¢

Sheets from Store—

Black	One Pass, C.R Soft Steel.	R G. Cleaned.
No. 16	₱ lb 2.90¢	3.00¢
Nos. 18 to 21	₱ lb 2.95¢	3.10¢
Nos. 22 and 24	₱ lb 3.05¢	3.20¢
No. 26	₱ lb 3.10¢	3.30¢
No. 28	₱ lb 3.20¢	3.50¢

Russia, Planished, &c.

Genuine Russia, according to assortment, ₱ lb 12 @14½
Patent Planished, W. Dewees Wood, ₱ lb A, 10¢; B, 9¢ net.

Galvanized.

Nos. 14 to 16 ₱ lb 3.10¢
Nos. 22 to 24 ₱ lb 3.45¢
No. 26 ₱ lb 3.65¢
No. 28 ₱ lb 4.00¢
No. 20 and lighter 36 inches wide, 25¢ higher.

Genuine Iron Sheets—

Galvanized.

Nos. 22 and 24 ₱ lb .5 75¢
No. 26 ₱ lb .6.25¢
No. 28 ₱ lb .7 25¢

Corrugated Roofing—

2½ in. corrugated.	Painted	Galvd.
No. 24 ₱ 100 sq. ft.	$3.85	4.80
No. 26 ₱ 100 sq. ft.	2.95	4.00
No. 28 ₱ 100 sq. ft.	2.60	3.75

Tin Plates—

American Charcoal Plates (per box.)

"A.A.A." Charcoal:
IC, 14 x 20 $6.35
IX, 14 x 20 7.60
A. Charcoal:
IC, 14 x 20 $5.30
IX, 14 x 20 6.40

American Coke Plates—Bessemer—

IC, 14 x 20 ..107 lb $4.40
IX, 14 x 20 5.40

American Terne Plates—

IC, 20 x 28 with an 8 lb. coating $8 30
IX, 20 x 28 with an 8 lb. coating 10.30

Seamless Brass Tubes—

List November 13, 1908. Base price 18¢

Brass Tubes, Iron Pipe Sizes—

List November 13, 1908. Base price 18¢

Copper Tubes—

List November 13, 1908. Base price 22¢

Brazed Brass Tubes—

List August 1, 1908. 20⅝¢ ₱ lb

High Brass Rods—

List August 1, 1908. 15¼¢ ₱ lb

Roll and Sheet Brass—

List August 1, 1908. 15¼¢ ₱ lb

Brass Wire—

List August 1, 1908. 15¼¢ ₱ lb

Copper Wire—

Base Price, Carload lots mill 15¼¢

METALS—

Tin—

Straits Pig ₱ lb 33 @33½¢

Copper—

Lake Ingot ₱ lb 14¾@15 ¢
Electrolytic ₱ lb 14½@15 ¢
Casting ₱ lb 14 @14½¢
Sheet Copper Hot Rolled, 16 oz (quantity lots) ₱ lb 18 ¢
Sheet Copper Cold Rolled, 1¢ ₱ lb advance over Hot Rolled.
Sheet Copper Polished 20 in. wide and under, 1¢ ₱ square foot
Sheet Copper Polished over 20 in. wide, 2¢ ₱ square foot
Planished Copper, 1¢ ₱ square foot more than Polished.

Spelter—

Western ₱ lb 7⅛@7¼¢

Zinc.

No 9, base, casks ₱ lb 8½¢ | Open ₱ lb 9¢

Lead.

American Pig ₱ lb 5¼@5½¢
Bar ₱ lb 6⅛@6¼¢

Solder.

½ & ½, guaranteed ₱ lb 20¼@20¾¢
No. 1 ₱ lb 17¾@18¼¢
Refined ₱ lb 16 @16¼¢
Prices of Solder indicated by private brand vary according to composition.

Antimony—

Cookson ₱ lb ..@10¢
Hallletts @9½¢
Other Brands @9 ¢

Bismuth—

Per. lb $2.00@$2.25

Aluminum—

No 1 Aluminum (guaranteed over 99% pure), in ingot for remelting 24¢
Rods & Wire Base Price 31¢
Sheets Base Price 33¢

Old Metals.

Dealers' Purchasing Prices Paid in New York

	Cents
Copper, Heavy cut and crucible	₱ lb 11.50@11.75
Copper, Heavy and Wire	₱ lb 11.00@11.25
Copper, Light and Bottoms	₱ lb 10.00@10.25
Brass, Heavy	₱ lb 7.75@ 8.00
Brass, Light	₱ lb 6.50@ 6.75
Heavy Machine Composition	₱ lb 10.50@10.75
Clean Brass Turnings	₱ lb 7.50@ 7.75
Composition Turnings	₱ lb 8.50@ 8.75
Lead, Heavy	₱ lb ....@ 3.75
Lead Tea	₱ lb ....@ 3.50
Zinc Scrap	₱ lb ....@ 4.50

THE IRON AGE

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